

SHARP SERVICE MANUAL

S08N4VC-A111H


VHS VIDEO CASSETTE RECORDER

MODEL **VC-A111HM**

The service manual covers only those items that differ from the VC-T310H. For information on any other items, refer to the service manual for the VC-T310H.

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PARTS LIST

PARTS REPLACEMENT

Replacement parts which have these special safety characteristics identified in this manual; electrical components having such features are identified by Δ in the Replacement Parts Lists.

The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

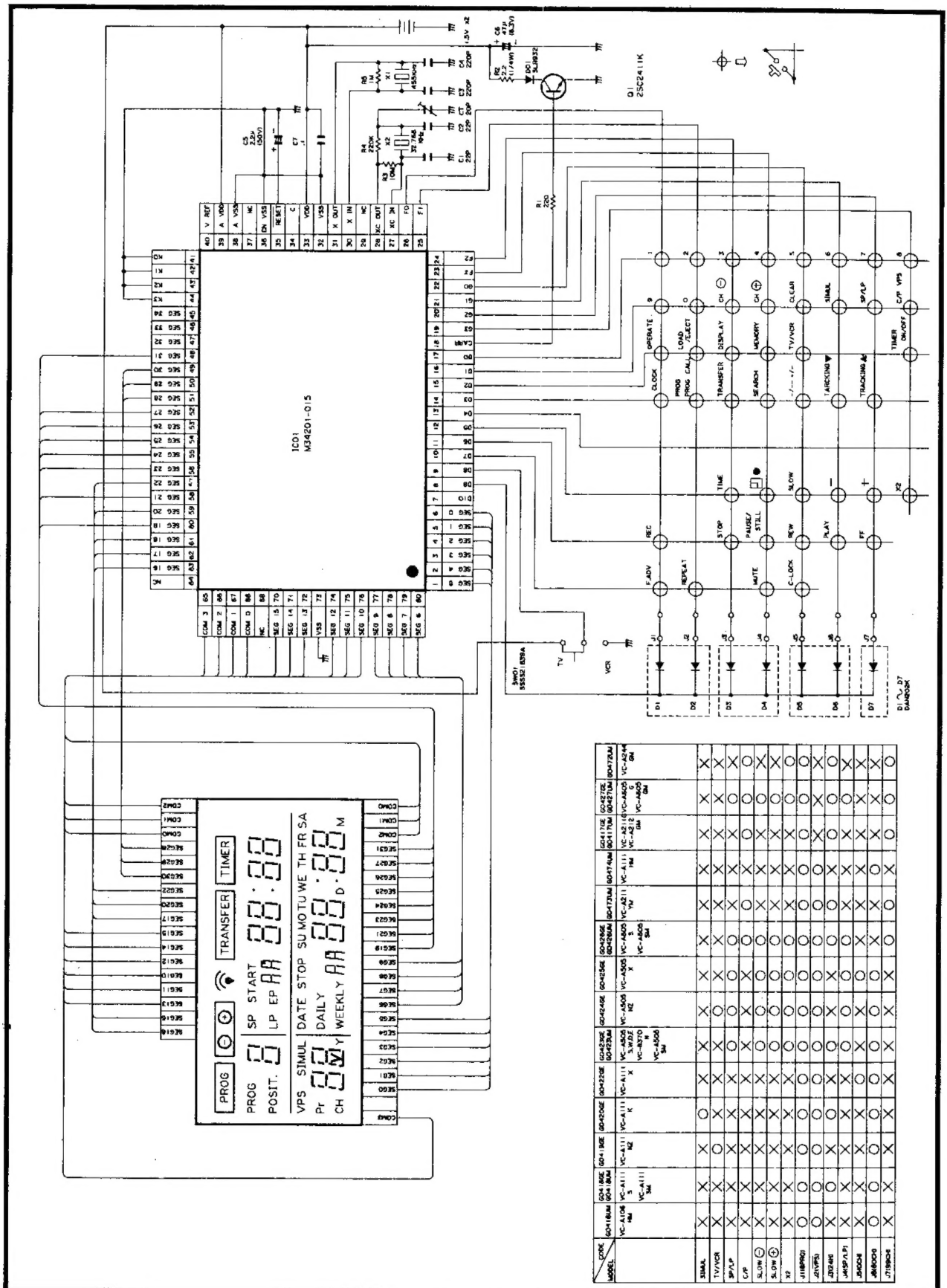
- | | |
|-----------------|----------------|
| 1. MODEL NUMBER | 2. REF. NO. |
| 3. PART NO. | 4. DESCRIPTION |
| 5. CODE | |

REF. NO.	PART NO.	★	DESCRIPTION	CODE
MISCELLANEOUS				
	RCNVR0013UMZZ	U	RF Converter	—
Y/C CIRCUIT				
	DUNTK2947TEVO		Y/C Board Assembly	—
DIODES				
D201, 202, 203, 204, 502, 503, 504	RH- DX0048UMZZ	U	1N4531	—
REF. NO.	PART NO.	★	DESCRIPTION	CODE
MAIN(SERVO, SYSTEM-CONTROL, IF) CIRCUIT				
	DUNTK2946TEV4		Main (Servo, System-Control, IF) Board Assembly	—
DIODES				
D701, 702, 704, 708, 712, 801, 804, 956, 957, 5901, 5902, 6602, 8802, 8803 D6601	RH- DX0048UMZZ	U	1N4531	—
	VHDDAP202K/ 1E			AA
CAPACITOR				
C711, 713, 726, 1562	RC- QZZ104UMYK	U	0.1 μ F, 6.3V, 10%, Mylar	—
C727	RC- QZZ473UMYK	U	0.047 μ F, 63V, 10%, Mylar	—
C739	RC- QZZ394UMYK	U	0.39 μ F, 63V, 10%, Mylar	—
C810	RC- QZA102TAYJ		1000 μ F, 50V, 5%, Mylar	AB
C1452, 1453	RC- QZZ334UMYK	U	0.33 μ F, 63V, 10%, Mylar	—
C1459	RC- QZZ333UMYK	U	0.033 μ F, 63V, 10%, Mylar	—
CAPACITORS				
C218	RC- QZZ224UMYK	U	0.22 μ F, 63V, 10%, Mylar	—
C224	RC- QZZ473UMYK	U	0.047 μ F, 63V, 10%, Mylar	—
C230	RC- QZZ104UMYK	U	0.1 μ F, 63V, 10%, Mylar	—
C523	RC- QZZ393UMYK	U	0.03 μ F, 63V, 10%, Mylar	—
TIMER CIRCUIT				
	DUNTK2954TEVO		Timer Board Assembly	—
DIODES				
D5001 5004, 5006, 5007, 5010, 5013, 5019, 5020, 5021	RH- DX0048UMZZ	U	1N4531	—
HEAD AMP CIRCUIT				
	DUNTK2948TEVO		Head Amp Board Assembly	—
CAPACITORS				
C302, 305	RC- QZZ104UMYK	U	0.1 μ F, 63V, 10%, Mylar	—
C309	RC- QZZ473UMYK	U	0.047 μ F, 63V, 10%, Mylar	—

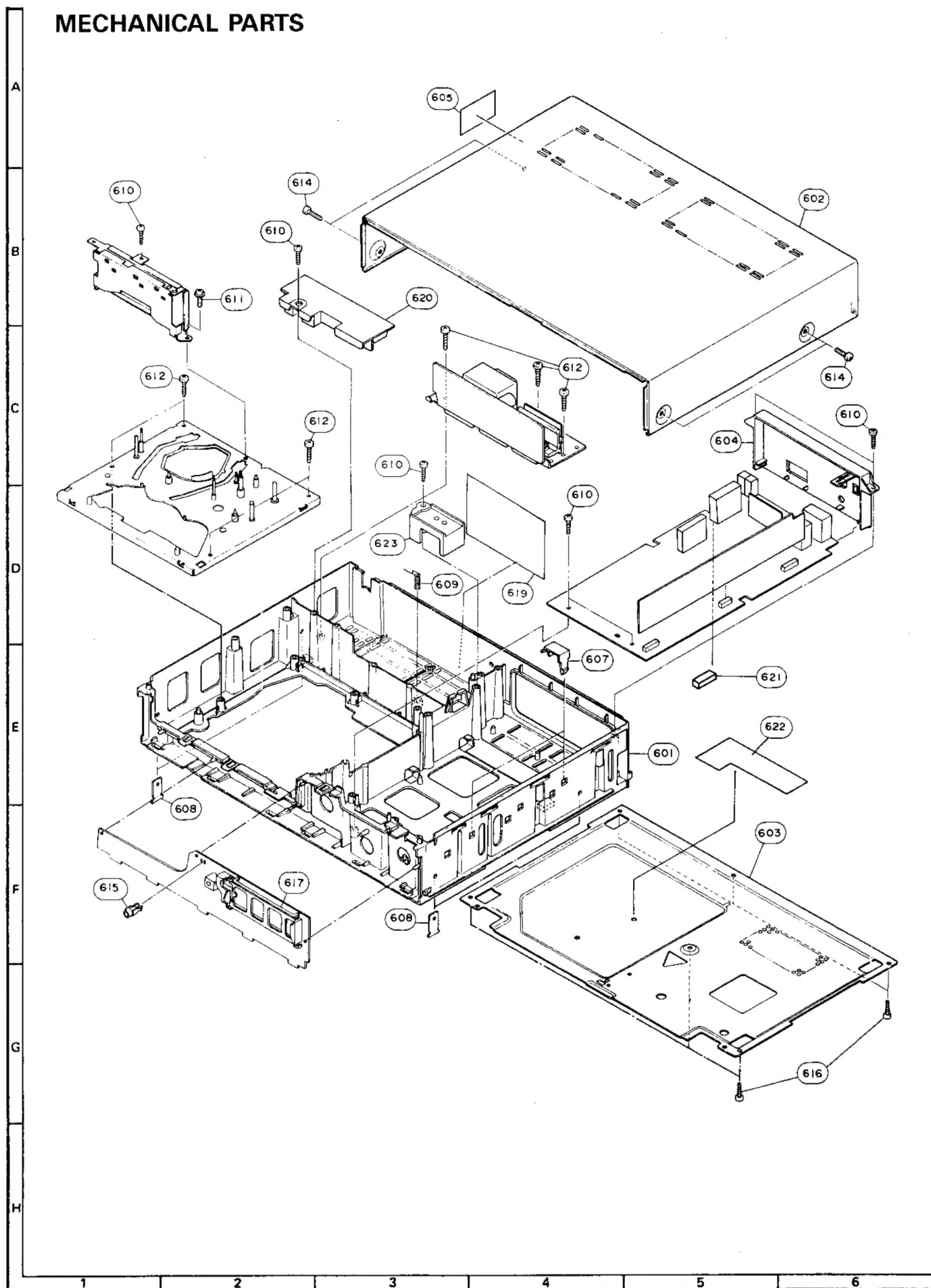
REF. NO.	PART NO.	*	DESCRIPTION	CODE	REF. NO.	PART NO.	*	DESCRIPTION	CODE
POWER CIRCUIT					THE OTHER PARTS				
	RDENT0318UMZZ	U	Power Board Assembly	—		QCNW- 3741UMZZ	U	Connecting Cord	—
						TGAN- A037WRR0	U	Guarantee Card	—
						Ti NS- 1210UMZZ	U	Operation Manual	—
INFRARED REMOTE CONTROL CIRCUIT					MECHANICAL PARTS				
	RRMCG0474UMSA	U	Infrared Remote Control Unit	—	601	GCABB1079UMZZ	U	Main Frame	—
TRANSISTOR					602	GCABA3046UMS3	U	Top Cabinet Ass'y	—
Q1	92P3TSN0005T	U	2SC2411K	—	603	GBDYU3052UMZZ	U	Bottom Plate	—
INTEGRATED CIRCUIT					604	GC6VA1513UMZZ	U	Antenna Terminal Cover	—
IC01	92P3SQ00109	U	M34201	—	605	TLABS0002UMZZ	U	Caution Label	—
DIODES AND CRYSTALS					607	LHLDZ1609UMZZ	U	Y/C Holder	—
D1, 2, 5, 6	92P3TSD0007T	U	DAN202K	—	608	QEARP0276UMFW	U	Earth Plate, Upper	—
D01	92P3QH00019	U	SLR932A-1-A	—	609	MSPRC0145UMFJ	U	Spring, Power	—
X1	92P3EF00021	U	455 kHz	—	610	XEBSD30P12000		Screw	AA
X2	92P3EQ00003	U	32.768 kHz	—	611	XHPSD30P06WS0		Screw	AA
MISCELLANEOUS					612	XEBSD40P12000		Screw	AA
SW01	92P3ELFA048	U	LCD	—	614	LX- HZ3040GEFF		Screw, Top Cabinet	AA
	92P3ETFA9701	U	Battery Terminal (A)	—	615	LHLDP1013GE00		Power LED Holder	AB
	92P3ETFA9801	U	Battery Terminal (B)	—	616	LX- HZ3047GEFF		Screw Bottom Plate	AA
	92P3ETFA9601	U	Battery Terminal (C)	—	617	LHLDZ1614GEZZ		Degitron Holder	AC
	92P3ECFA0011	U	Connector	—	619	TLABM0074UMZZ	U	Model Label	—
	92PSSSS21389A	U	Switch, TV/VCR	—	620	LHLDZ1624GEZZ		Insulator	AC
CABINET PARTS					621	PSPA0202GEZZ		Spacer	AC
	92PFA11D6803	U	Upper Cabinet	—	622	PSPA0200UMZZ	U	Spacer	—
	92PFA11E1702	U	Bottom Cabinet	—	623	LHLDZ1619UMZZ	U	Tuner Holder	—
	92PFA11D2101	U	Battery Cabinet	—	FRONT PANEL PARTS				
	92P2A391060	U	Screw	—	501	CPNLC1542TEV1	U	Front Panel Ass'y	—
	92P2A502100	U	Screw	—	501-1	HDECQ0538UMSA	U	Front Decoration Cover	—
	92PFA23A5001	U	Spacer	—	501-2	JBTN- 2227UMSA	U	Button, Record	—
	92PFA42B0205	U	Rubber Key A	—	501-3	QEARP0272UMFW	U	Earth	—
	92PFA42B2407	U	Rubber Key B	—	501-4	PC6VU9135GESB		Display Filter	AF
	92PFA58A6601	U	Infrared Cover	—	501-5	LHLD51010UMZZ	U	Door Latch	—
	92PFA61A8806	U	Knob	—	501-6	GC6VA1522UMSA	U	Cover, Power LED	—
	92PFA62A9709	U	Indication Plate	—	501-7	JBTN- 2236UMSA	U	Button, Power	—
	92PFA62B1720	U	Indication Plate	—	501-8	GC6VA1425UMZZ	U	Cover, Remote Control	—
					501-9	JBTN- 2237UMSA	U	Button, Eject	—
					501-10	Hi NDP1550UMSA	U	Indication Plate, inside the door	—
					501-11	LANGF9363UM00	U	Angle, Door	—
					501-12	GD6RF1536UMSA	U	Door	—
					501-13	HBDGB1001UMSB	U	Badge "SHARP"	—
					501-14	TCAUH3178UMZZ	U	Caution Label	—
					501-16	TLABH0420UMZZ	U	Label (inside the door)	—
					501-17	TLABZ0220UMZZ	U	Made in UK Label	—
					501-18	ZTAPEN05330ME		Asetate Tape	AA

INFRARED REMOTE CONTROL CIRCUIT

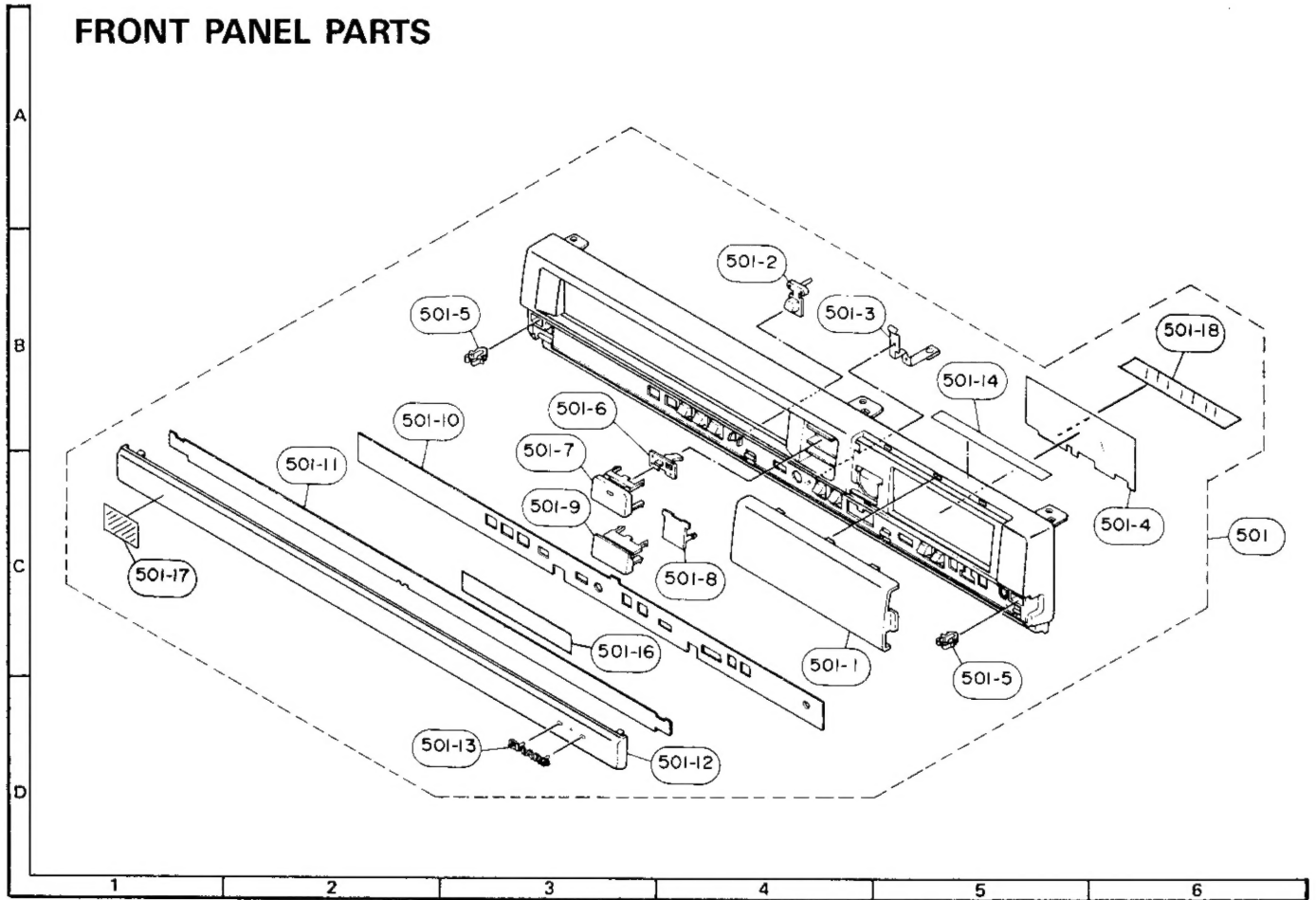
RRMCG0474UMSA

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MECHANICAL PARTS



FRONT PANEL PARTS



PACKING OF THE SET

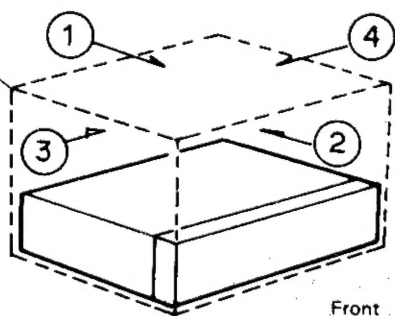
• Setting positions of the Knobs

Full auto	1 position	Colour mode	B & G Mute
Picture tone	Center click	Band selector	Normal
RF converter output	36 CH	Test signal	OFF

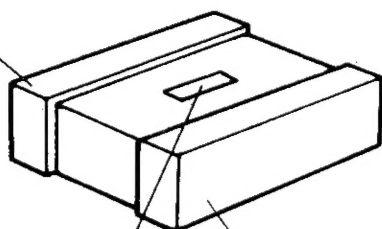
* Accessories

- ★ TGAN-A037WRRO Gurantee card
- ★ TINS-1210UMZZ Operation manual
- ★ QCNW-3741UMZZ Antenna cord
- ★ UBATU0007UMZZ Dry Battery

- ★ SPAKP0005GEZZ
Polystyrene Sack

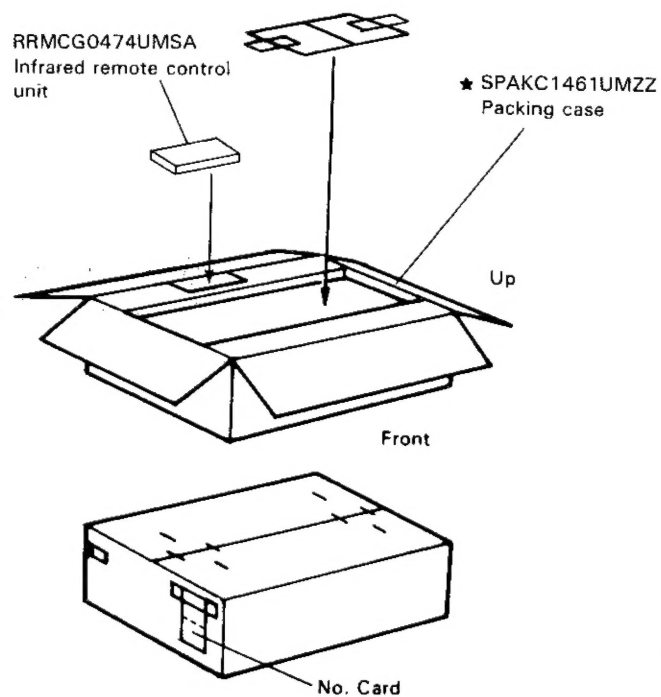


- ★ SPAKX0477UMZZ
Buffer material (Rear)



- ★ SPAKX0476UMZZ
Buffer material (Front)

Fix with craft tape



★ Not Replacement Items

SHARP

SHARP TECHNICAL MANUAL

T98i2VC-A111X

VHS

VIDEO CASSETTE RECORDER

(PAL SYSTEM)

SERIES	MODEL NO.	VIDEO HEAD
VC-A111 Series	VC-A111X,NZ,S(BK,W),SM(BK),HM	2-head system
VC-A105 Series	VC-A105X,NZ,S(BK),B,YM(BK),HM,SM(BK),E,W,VC-B320N	
VC-A211 Series	VC-A211G(BK),YM(BK),GM(BK)	
VC-A244 Series	VC-A244GM(BK)	
VC-T212 Series	VC-T212GM(BK)	
VC-T310 Series	VC-T310S(BK),H,SM(BK),HM	
VC-T410 Series	VC-T410G(BK),GM(BK)	
VC-A114 Series	VC-A114D	
VC-A505 Series	VC-A505X,NZ,S(BK),SM,W,VC-B370N	Double azimuth 4-head system
VC-A605 Series	VC-A605G(BK),S(BK),GM(BK),YM(BK)	
VC-T510 Series	VC-T510X,HM	

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SHARP CORPORATION

1. MECHANISM

OUTLINE

This VTR is a low-profile, shelf-mount type working on the VHS system. Many newly developed mechanisms have been adopted to make this model thinner, more reliable and power-saving compared to the conventional models.

Main features include:

- 1) Use of a single-cam system which can cope with various modes
- 2) A newly developed thin capstan DD (Direct Drive) motor
- 3) Appropriate torques achieved by a geared reel drive system
- 4) Newly developed loading system for systemization of the cassette control and loading mechanisms

CONFIGURATION

The mechanism of this model can be roughly divided into the following sections.

System sections

- 1) Tape drive train system
- 2) Loading mechanism
- 3) Cassette tape take-up mechanism
- 4) PAD (Power Assist Drive) mechanism
- 5) Cam switch
- 6) Cassette control mechanism

These sections are discussed one by one as follows.

1-1. Tape Drive Train System

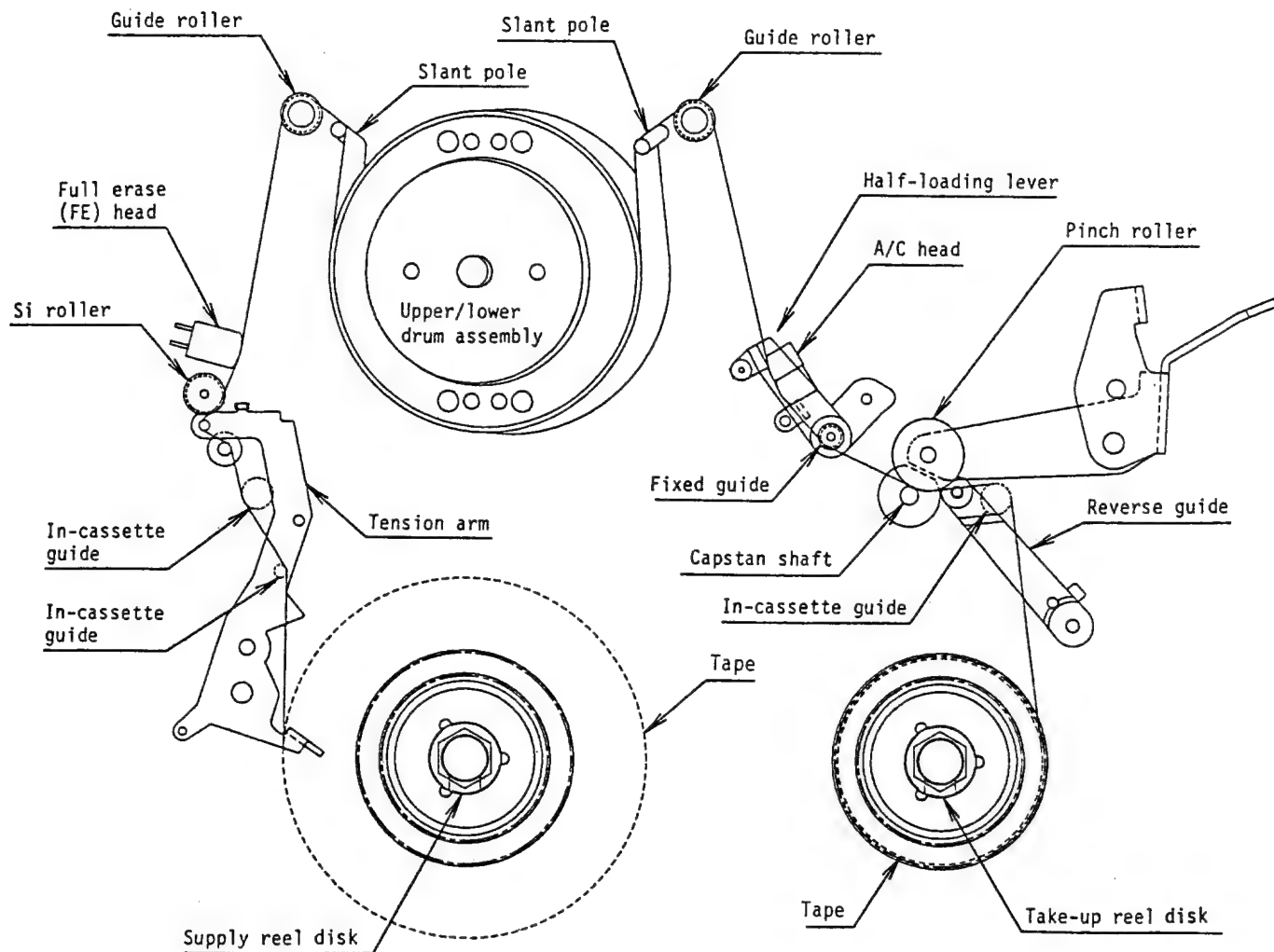


Figure 1-1. Tape Travel System

Features

- 1) Miniaturized Si (Supply impedance) roller from 16 mm to 7 mm dia.; much smaller mechanism realized.
- 2) Fixed erasing head; simple design.
- 3) Enlarged guide roller from 6 mm to 7 mm dia.; reduces the number of revolutions in high-speed video search operation.
- 4) Miniaturized pinch roller from 18 mm to 14 mm dia.; subcompact mechanism accomplished.
- 5) The reverse guide works in Video search (VS) and rewind (REW) modes only, reducing the risk of tape damage.

1-2. Loading Mechanism

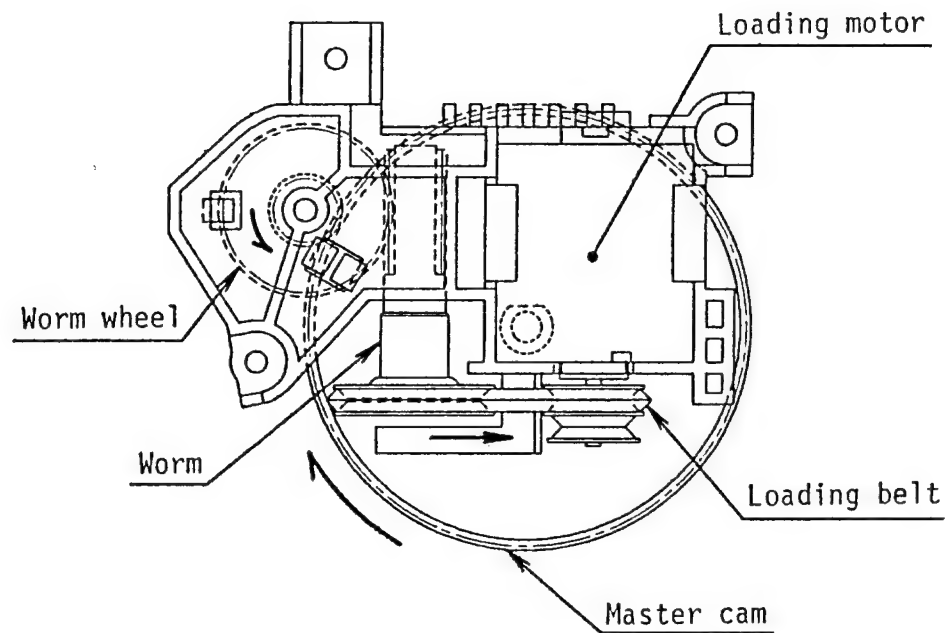


Figure 1-2. Loading Mechanism (Upper stage)

Features

- 1) The mechanism is driven by the loading motor.
- 2) The loading motor is intended to drive the mechanism and the cassette housing.
(Refer to the description on the clutch shifting mechanism on page 17.)
- 3) The four-cam system which used to control the operation of the whole transport mechanism has been combined into a single master cam.

1-3. Cassette Tape Take-up Mechanism

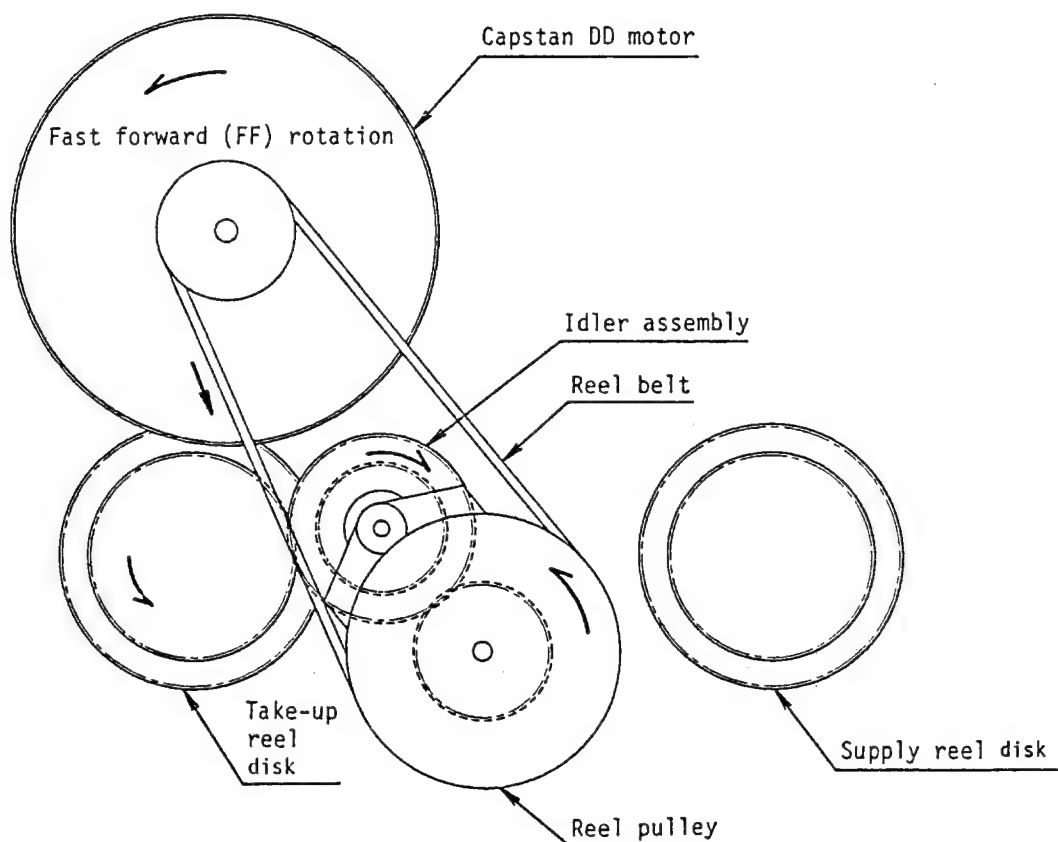


Figure 1-3. Cassette Tape Take-up Mechanism 1 (Lower stage)

Features

- 1) The reel disk to be driven by the idler assembly is switched by changing the rotational direction of the capstan DD motor.
- 2) The reel pulley and the idler assembly are always engaged with each other, and the rotation of the capstan DD motor is transmitted through the reel belt to the supply or take-up reel disk.
- 3) The idler assembly consists of a large and a small gear in a monoblock construction and mounted in the mechanism to allow vertical slide operation.
- 4) Each reel disk incorporates a slip mechanism to take up the tape without any slack and at an appropriate take-up torque in recording, playback and trick play operations. (large gear)

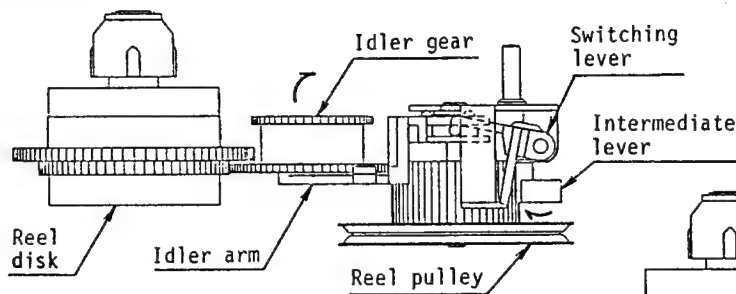


Figure 1-4. Gear Engagement in Fast Forward and Rewind Operations

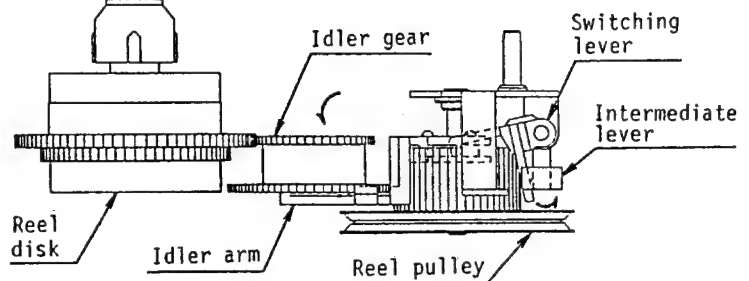


Figure 1-5. Gear Engagement in Recording, Playback and Trick Play Operations

- 5) In the fast forward and rewind modes, the large idler gear engages with the small gear of the reel disk, not through the torque limiter built in the reel disk. They work as a simple gear mechanism to transfer the revolving motion to the reel disk. (Figure 1-4.)
- 6) In the recording, playback and trick play modes, the idler arm moves to the lower position so that the small idler gear engages with the large gear of the reel disk. In this case, the rotation of the idler assembly is transmitted through the torque limiter built in the reel disk to the reel disk. (Figure 1-5.)

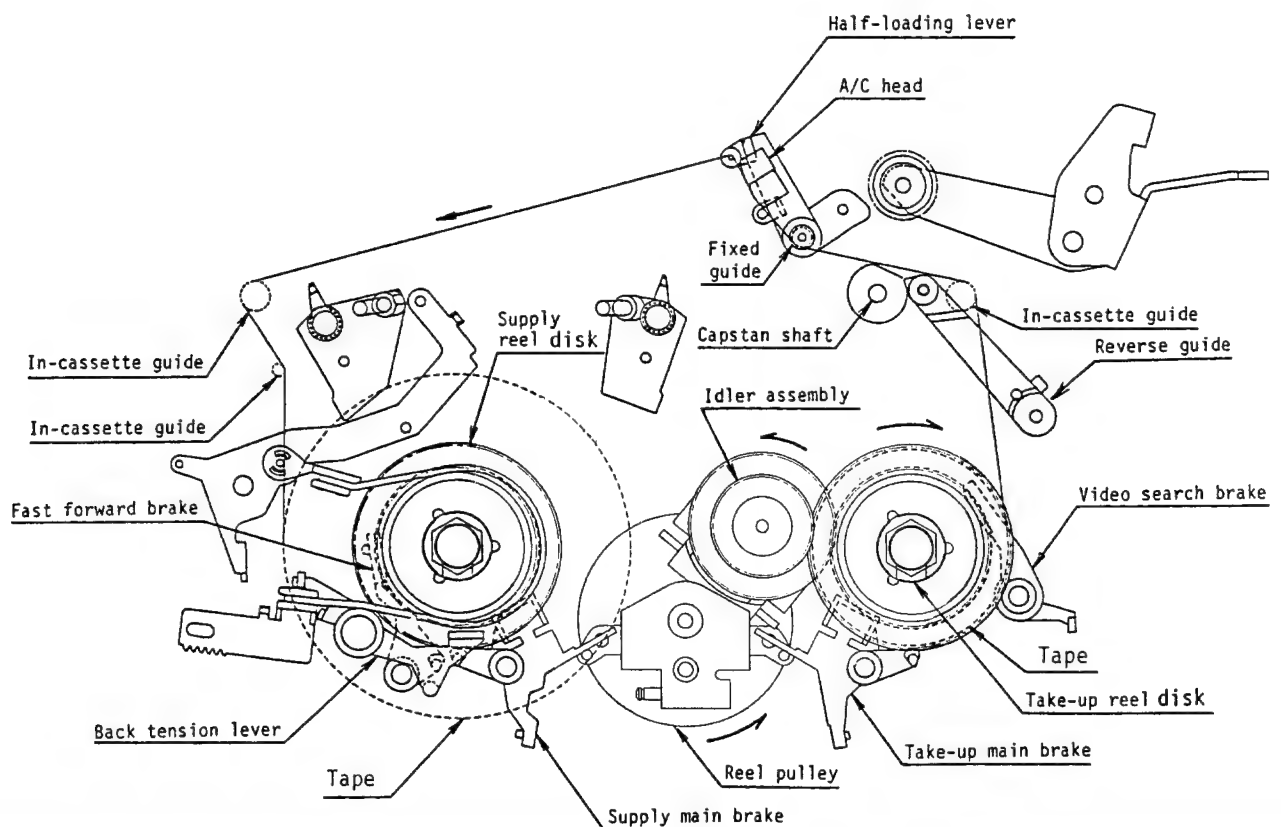


Figure 1-6. Cassette Tape Take-up Mechanism 2 (Upper stage)
Fast forward operation

- 7) In fast forward and rewind operations, a back tension is provided by the fast forward brake and video search brakes. (Figures 1-6. and 1-7.)
- 8) The idler gear is positioned as shown in Figure 1-5. when tape loading is completed. The limiter gear of the take-up reel disk then goes into an operating condition, and its sliding motion absorbs the change in tape diameter while the tape is being wound in order to compensate the reel's revolving speed. (Figures 1-5. and 1-8.)
- 9) In playback and recording operations, a back tension is provided by a combined force of the tension band, tension arm and tension spring at the supply reel disk. (Figure 1-8.)
- 10) The back tension in the VS and REW modes is given by the video search brake for the take-up reel disk. (Figure 1-9.)

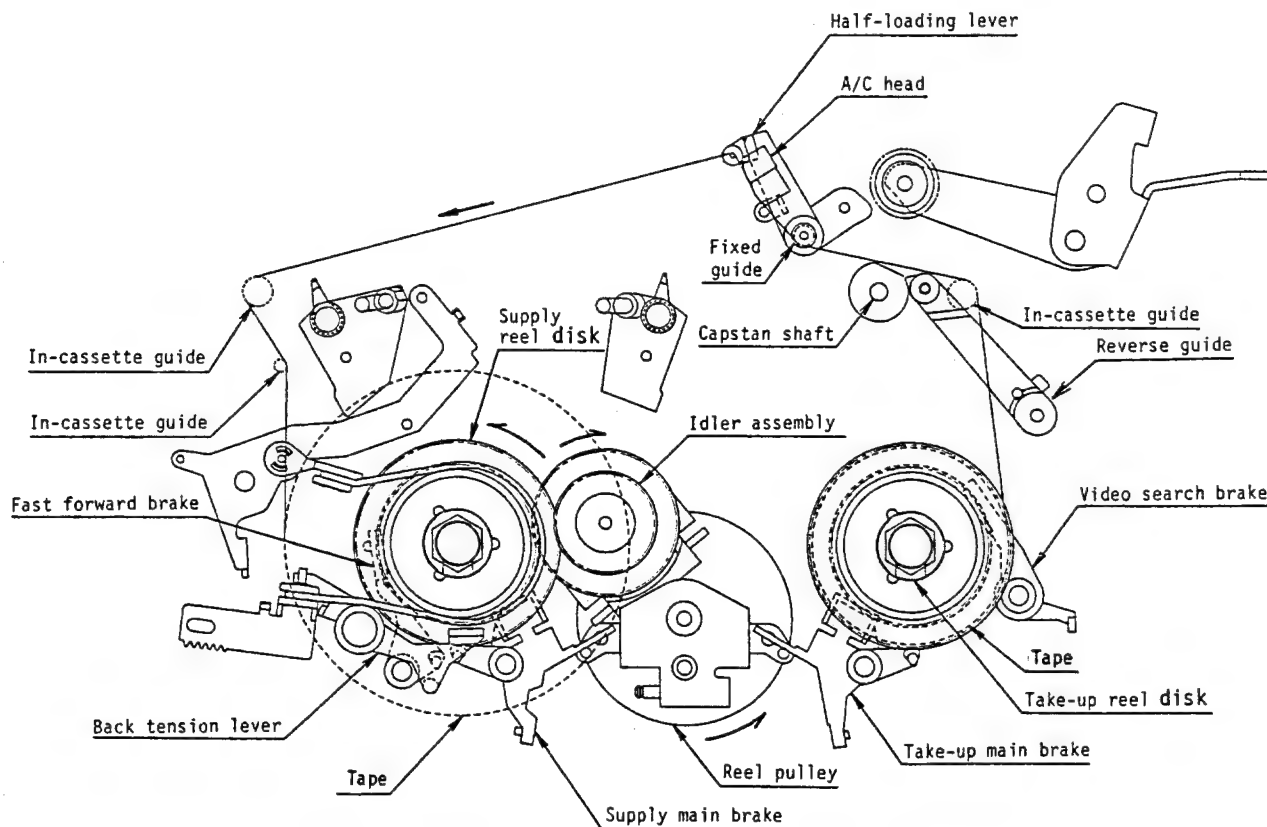


Figure 1-7. Cassette Tape Take-up Mechanism 3 (Upper stage)
Rewind operation

- 11) In the VS and REW modes, the tension release lever slackens the tension band so that only the brake of the back tension lever acts on the supply reel disk. (Figure 1-9.)
- 12) The reverse guide works in the VS and REW modes in order to stabilize tape drive train during reverse running. (Figure 1-9.)

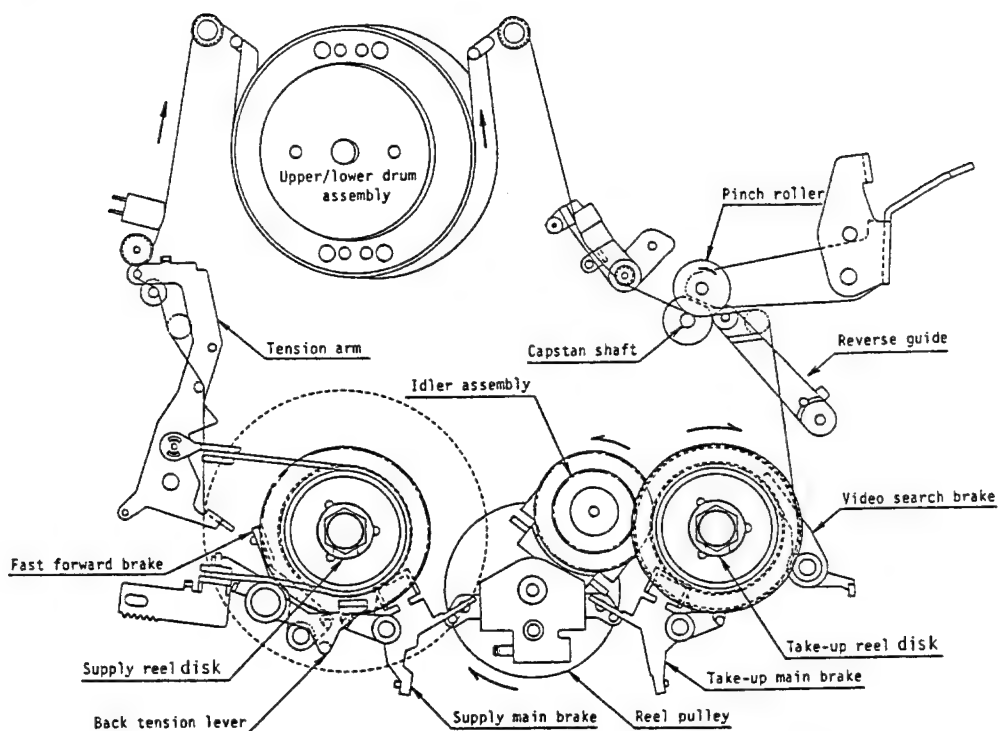


Figure 1-8. Cassette Tape Take-up Mechanism 4 (Upper stage)
Recording and playback operations

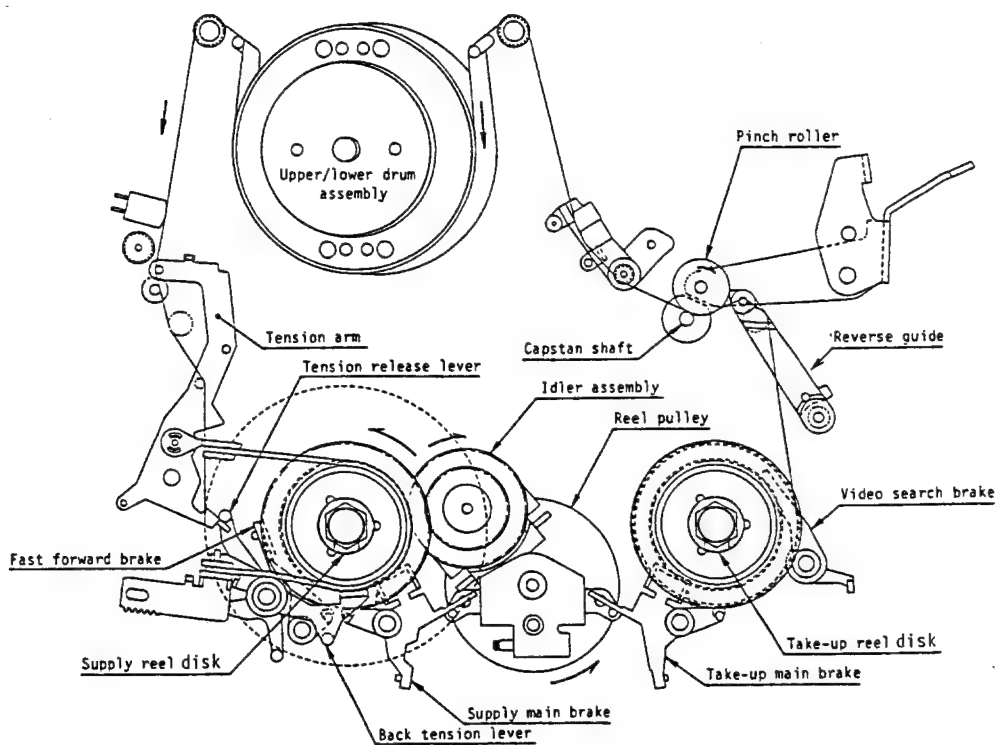


Figure 1-9. Cassette Tape Take-up Mechanism 5 (Upper stage)
VS and REW operations

1-4. PAD (Power Assist Drive) Mechanism

1) Master cam grooves

As shown in Figure 1-10., the single master cam has some grooves on its both sides to bring the mechanism in various modes. The control levers are guided along these grooves. Precise switching is also guaranteed with the interlocking of this cam and the cam switch.

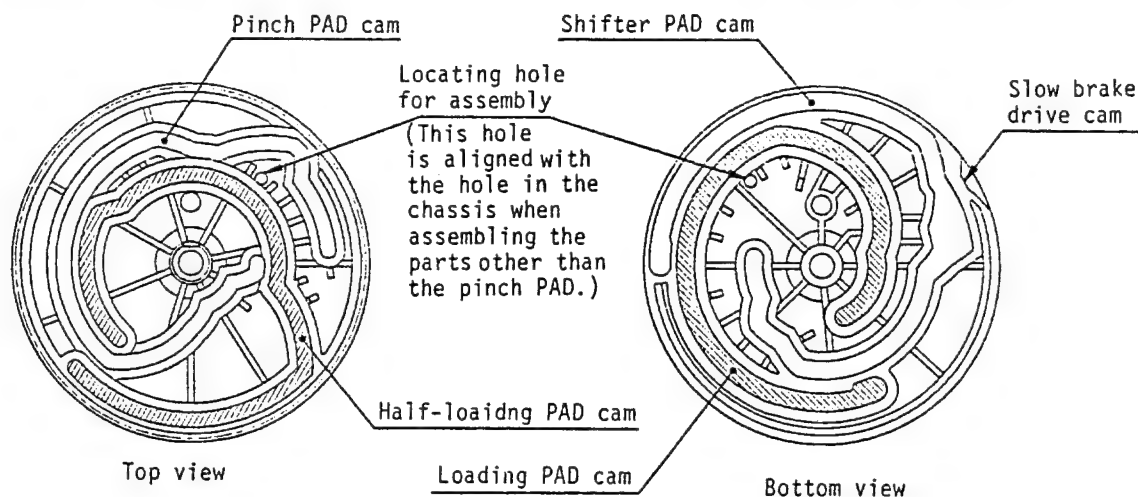


Figure 1-10.

2) Positional relation and operation of loading gears

The loading gear S is aligned with the loading gear T so that the locating mark 1 (round projection) of the former gear engages with the notch on the circumference of the latter gear. See Fig. 1-11.

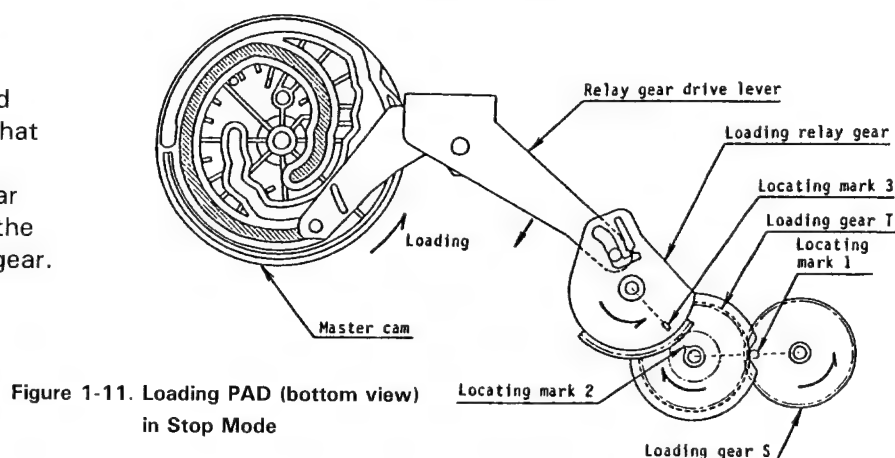


Figure 1-11. Loading PAD (bottom view) in Stop Mode

Next, the locating mark 2 of the small gear of the loading gear T is aligned with the locating mark 3 of the loading relay gear.

Figure 1-11. and Figure 1-12. show the positional relation in Stop and Play mode, respectively. Note the difference in the position of the relay gear drive lever with respect to the master cam groove between two modes.

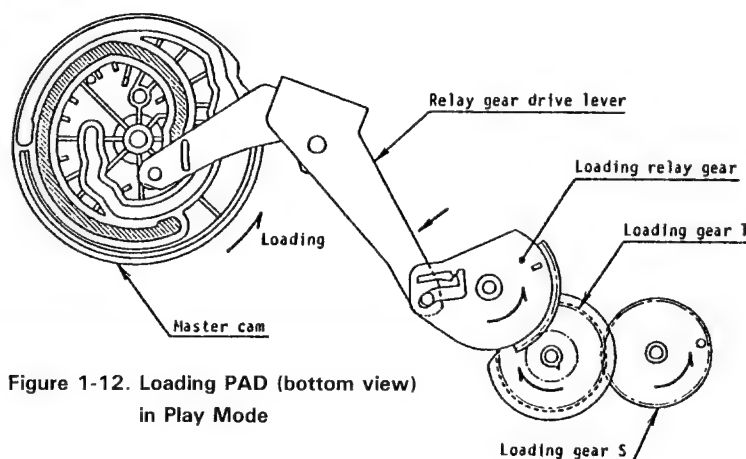


Figure 1-12. Loading PAD (bottom view) in Play Mode

3) Positional relation and operation of pinch roller lever (other than in eject operation)

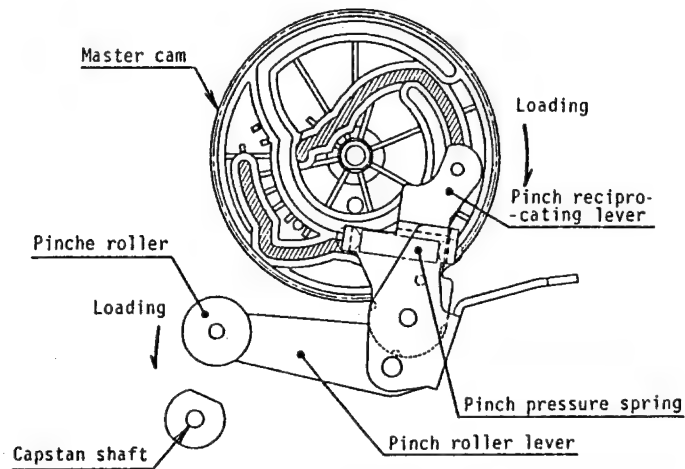


Figure 1-13. Stop Mode (FF/REW)

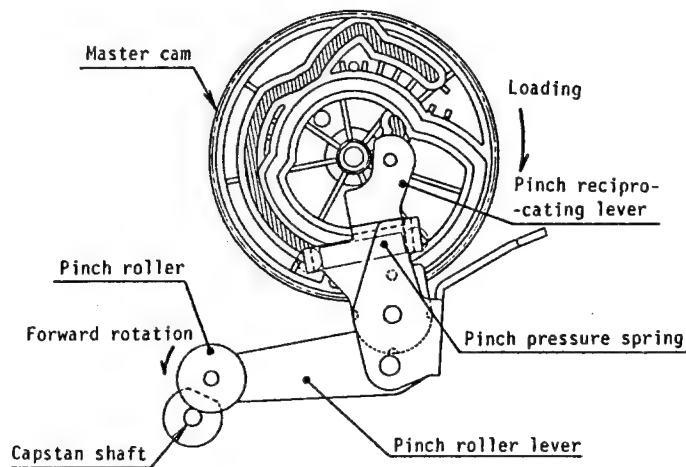


Figure 1-14. Playback Mode

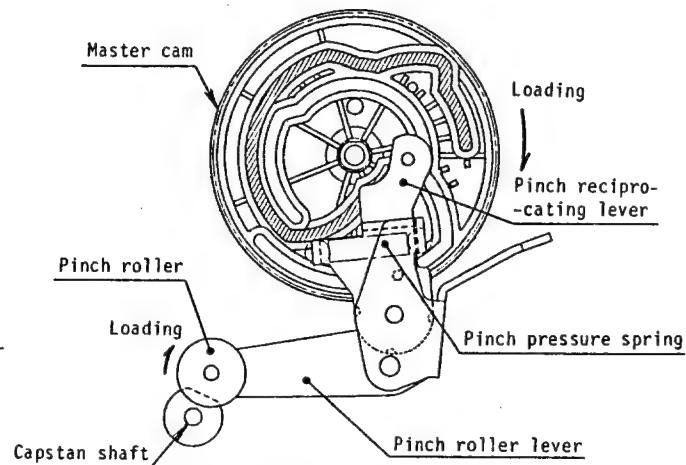


Figure 1-15. Positioning in Pause Mode

When the pinch roller has been pressed against the capstan shaft, the master cam rotates to the position shown in Figure 1-14. Then, the pinch pressure spring gives a necessary pressure (1,000 - 1,200 g) to feed the tape.

Just before going to the video search rewind mode or at short rewind operation in the REC/PAUSE mode, the master cam once rotates to the position shown in Figure 1-15. to slightly release the pinch roller pressure; this is just to allow the capstan to feed the tape while the idler assembly is shifting toward the supply reel disk. Then, it reverts to the position shown in Figure 1-14. and feeds the tape in the reverse direction to ensure stable tape reversing.

4) Operation of half-loading lever

- The cassette is loaded in the normal position only in the FF and REW modes by the master cam and released in the other modes.
- The half-loading lever is always kept at a fixed position by the half-loading reciprocating lever, half-loading reciprocating spring and half-loading drive lever.

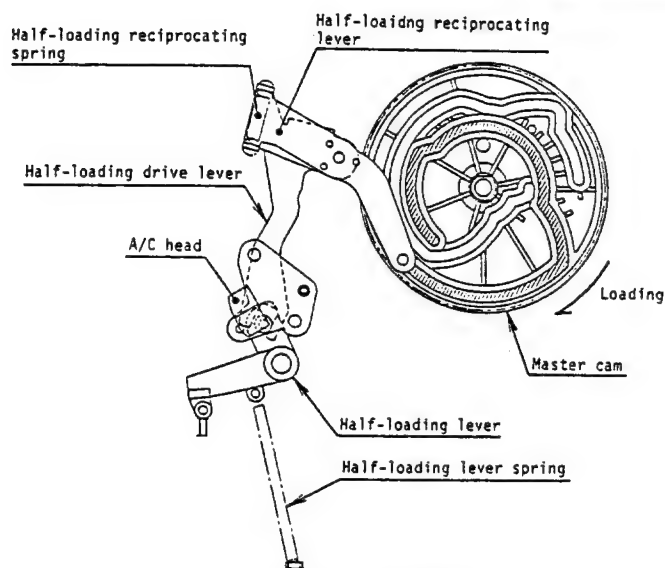


Figure 1-16. Eject Mode

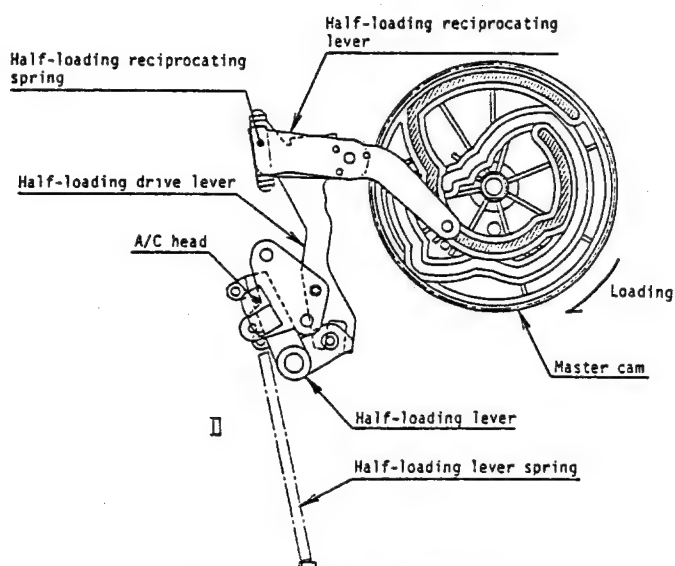


Figure 1-17. Stop Mode (FF/REW)

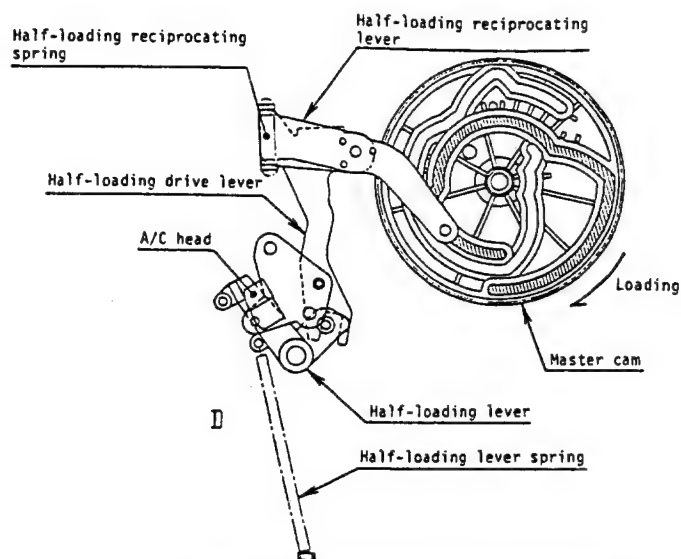


Figure 1-18. Recording and Playback Modes

5) Operation of brake shifter

The relay shifter transfers the driving force of the master cam to the brake shifter to cause a linear motion of the brake shifter as shown in Figure 1-19.

The brake shifter performs the following operations:

- Activation and Releasing of the main brake
- Vertical movement of the idler lever
- Activation and Releasing of the fast forward brake
- Activation and Releasing of the back tension brake
- Switching of the driving force of the video search brake
- Releasing of the tension arm

Further, the relay shifter performs activation and releasing of the reverse guide.

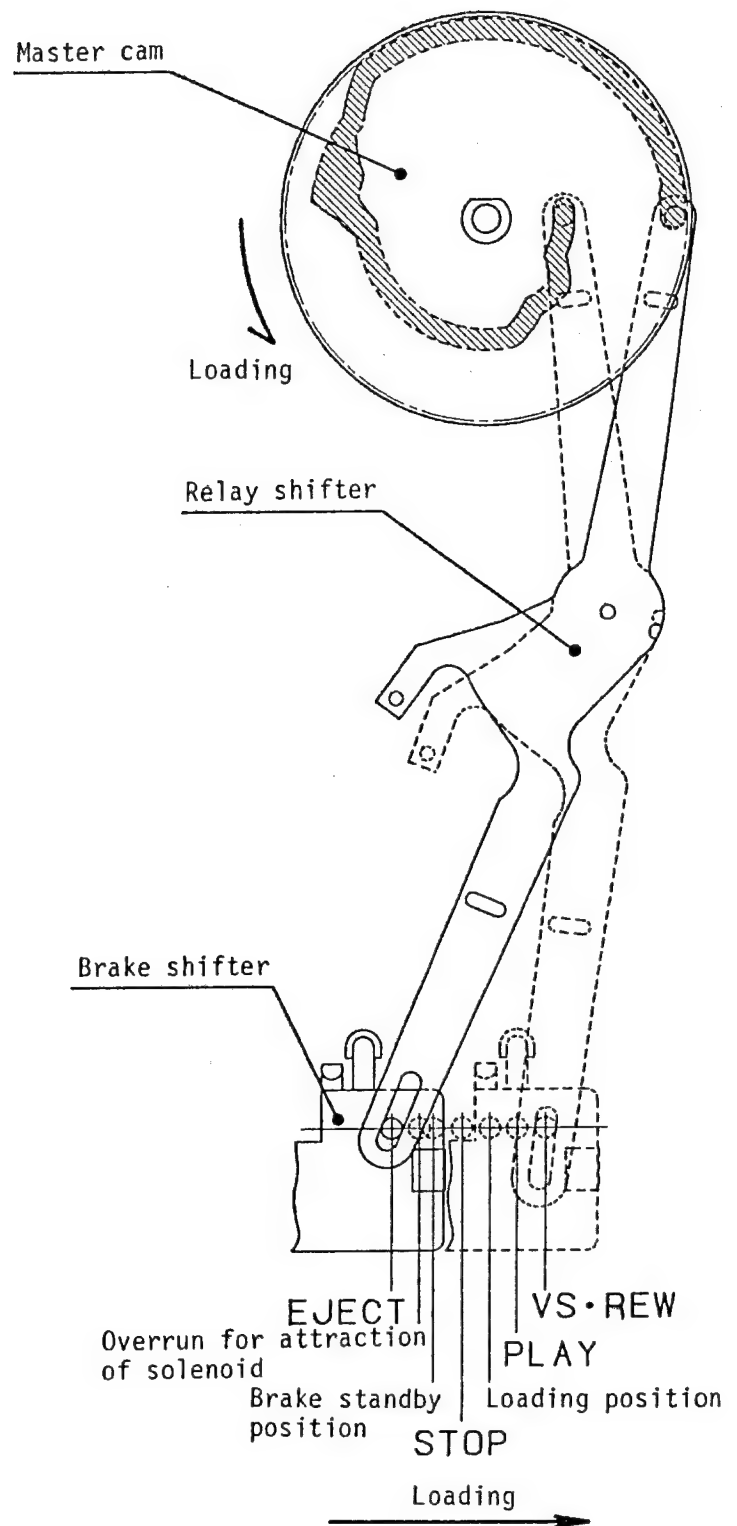


Figure 1-19.

1-5. Cam Switch

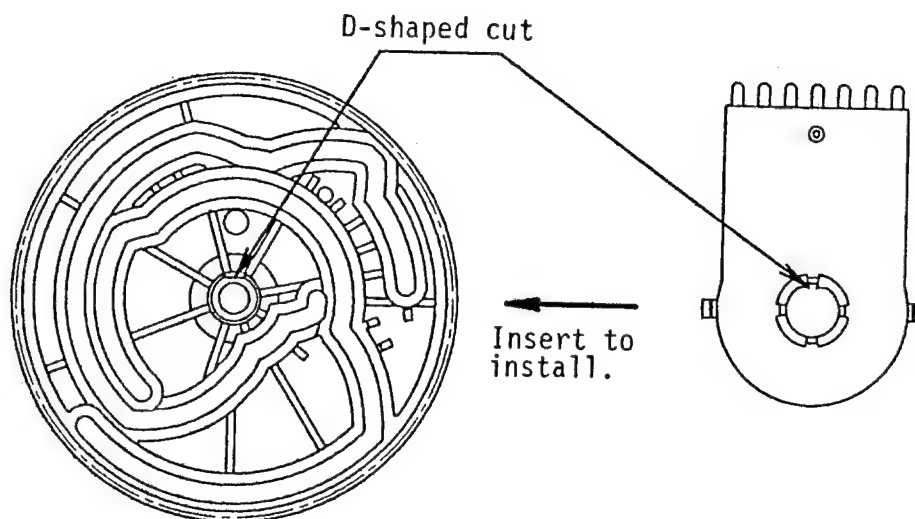


Figure 1-20. Cam Switch Alignment

The cam switch is installed with its D-shaped cut aligned with the D-shaped cut of the master cam. (The specially devised cam switch allows its alignment irrespective of the angle of rotation.)

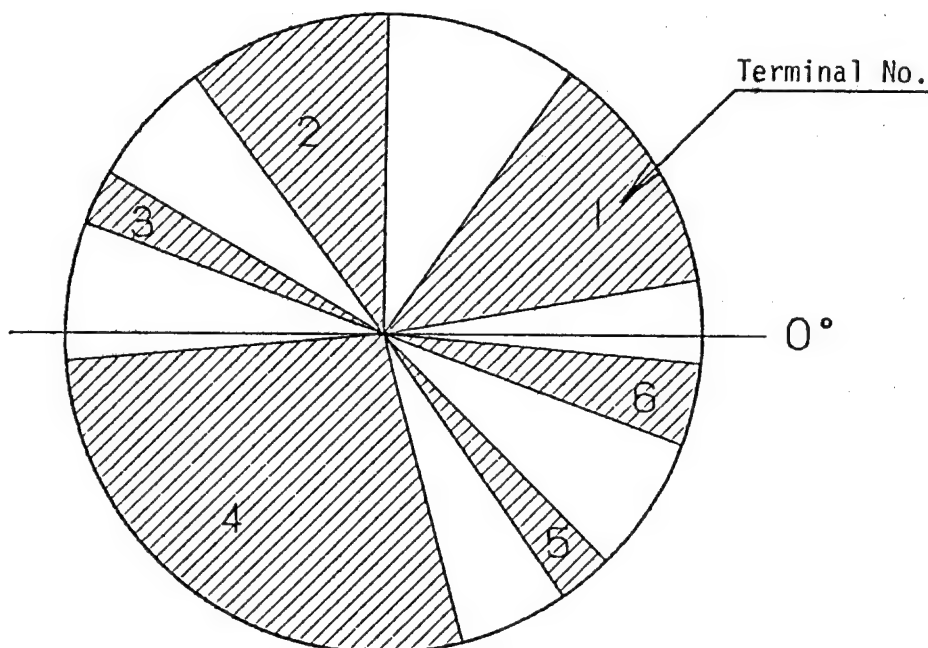


Figure 1-21. Structure of Cam Switch

The cam switch has an internal pattern as shown in Figure 1-21. and turns on the circuit at the shaded sectors. The system controller determines the mode of the mechanism by detecting turning on and off of the electric signal as the six shaded sectors make and break the circuit.

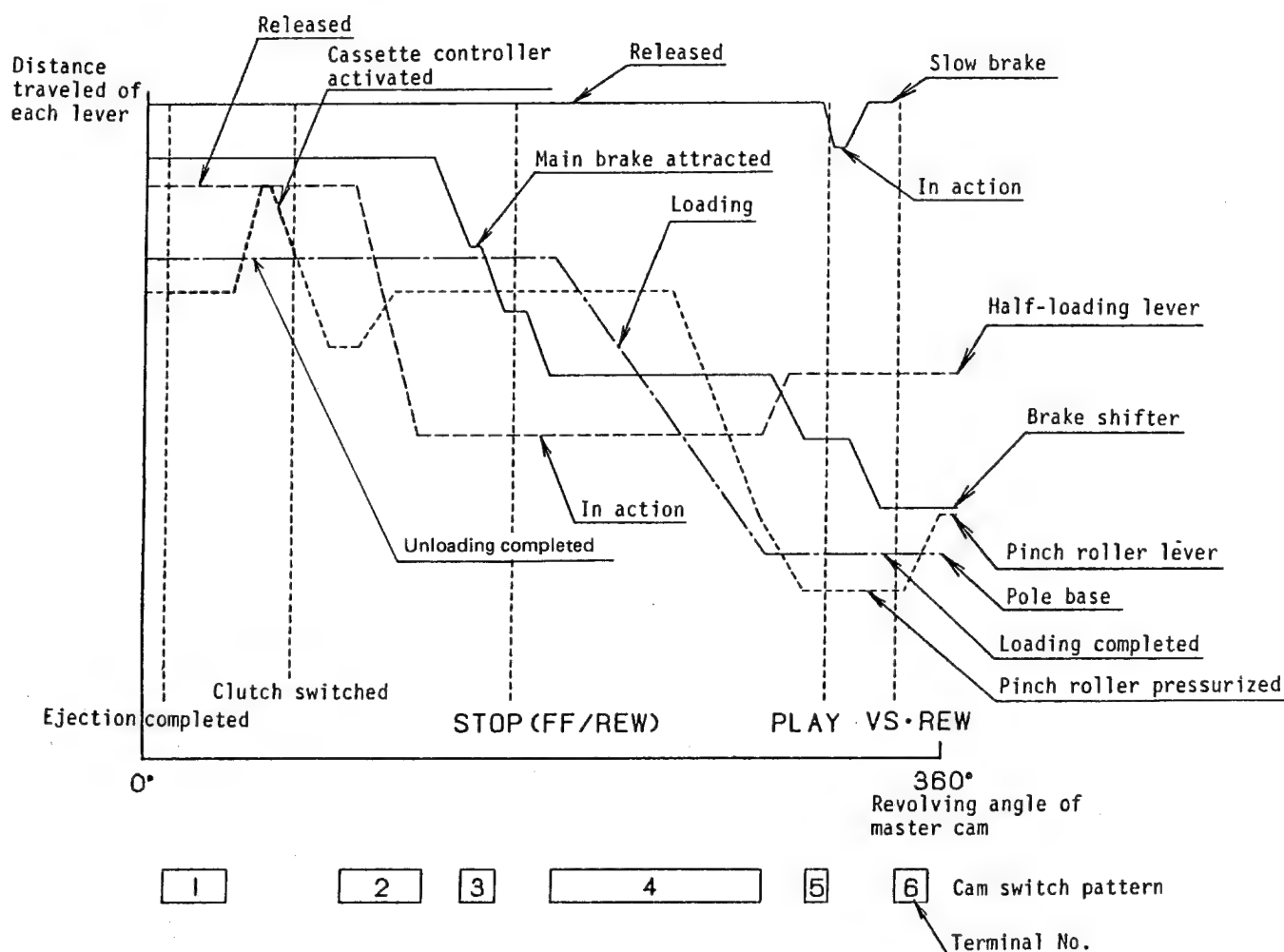


Figure 1-22. Relation between Cam Switch and Mechanism

Figure 1-22. shows the relation between the cam switch position and the actions of the individual components.

1-6. Cassette Control Mechanism

1) Cassette controller drive mechanism

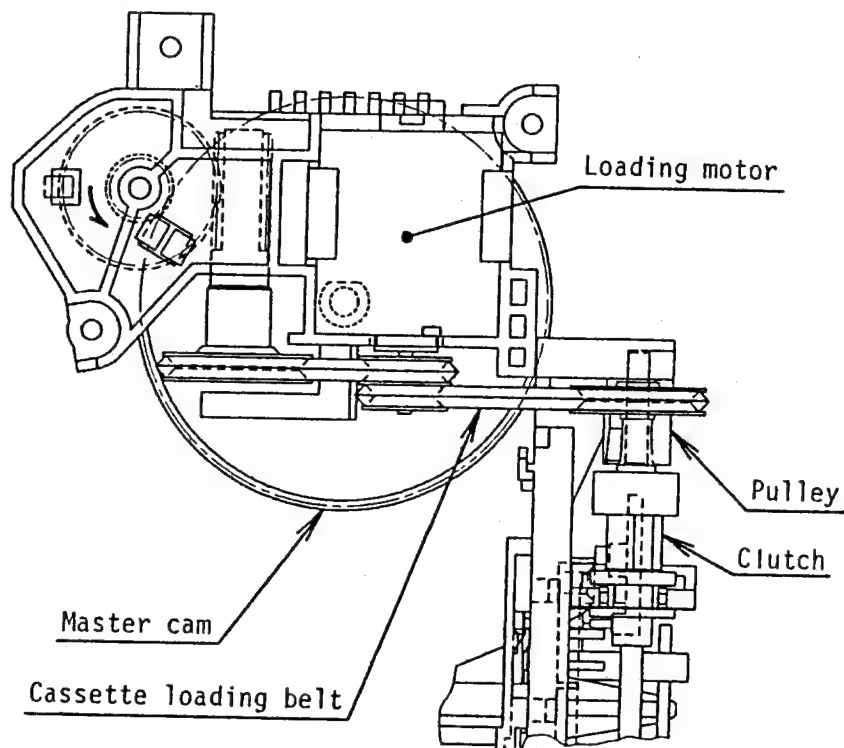


Figure 1-23. Cassette Controller Drive Mechanism

Feature

The driving force of the loading motor is always transmitted to the pulley of the cassette controller by the cassette loading belt as shown in Figure 1-23.

1-7. Clutch Shifting Mechanism

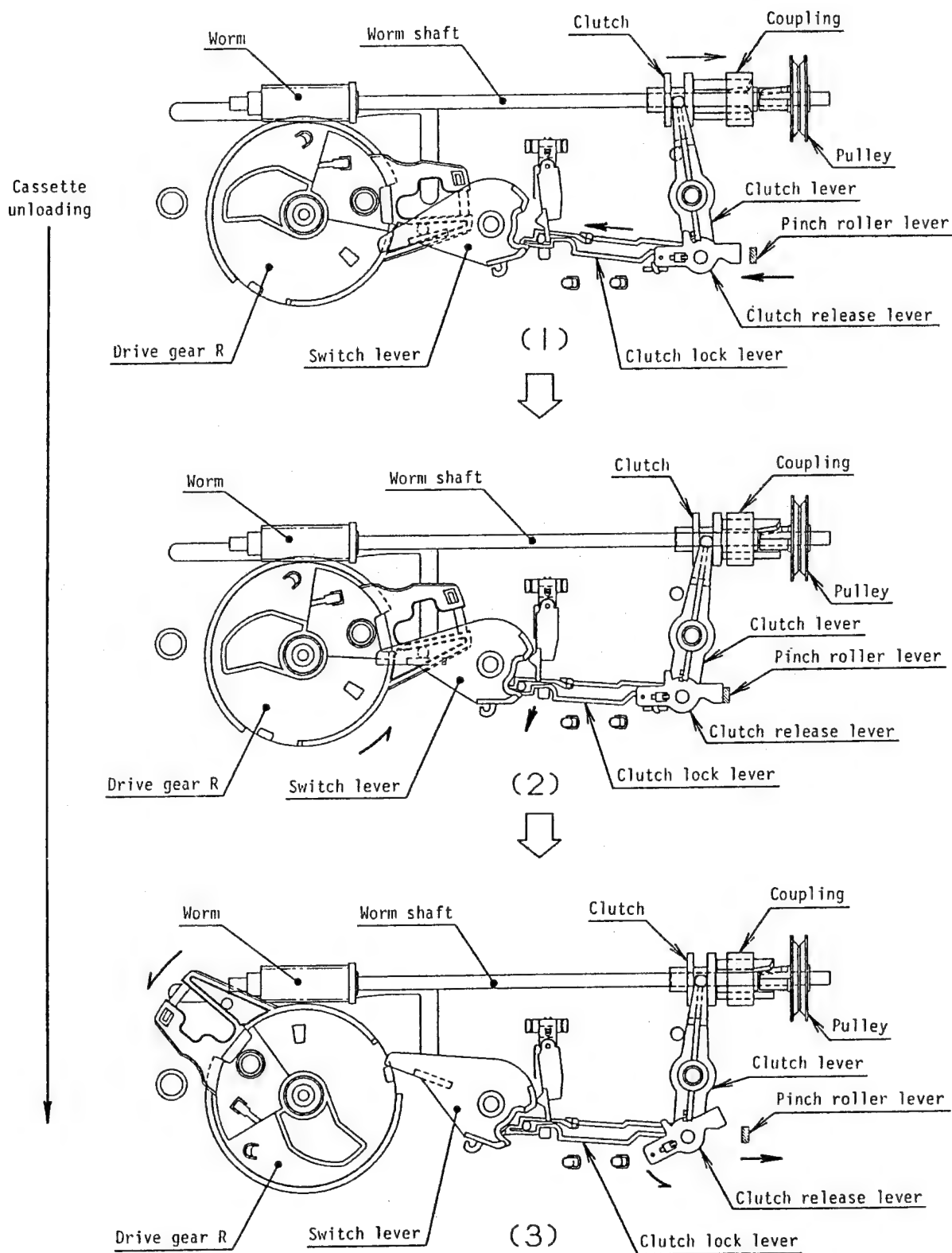


Figure 1-25. Clutch Shifting Sequence during Cassette Unloading

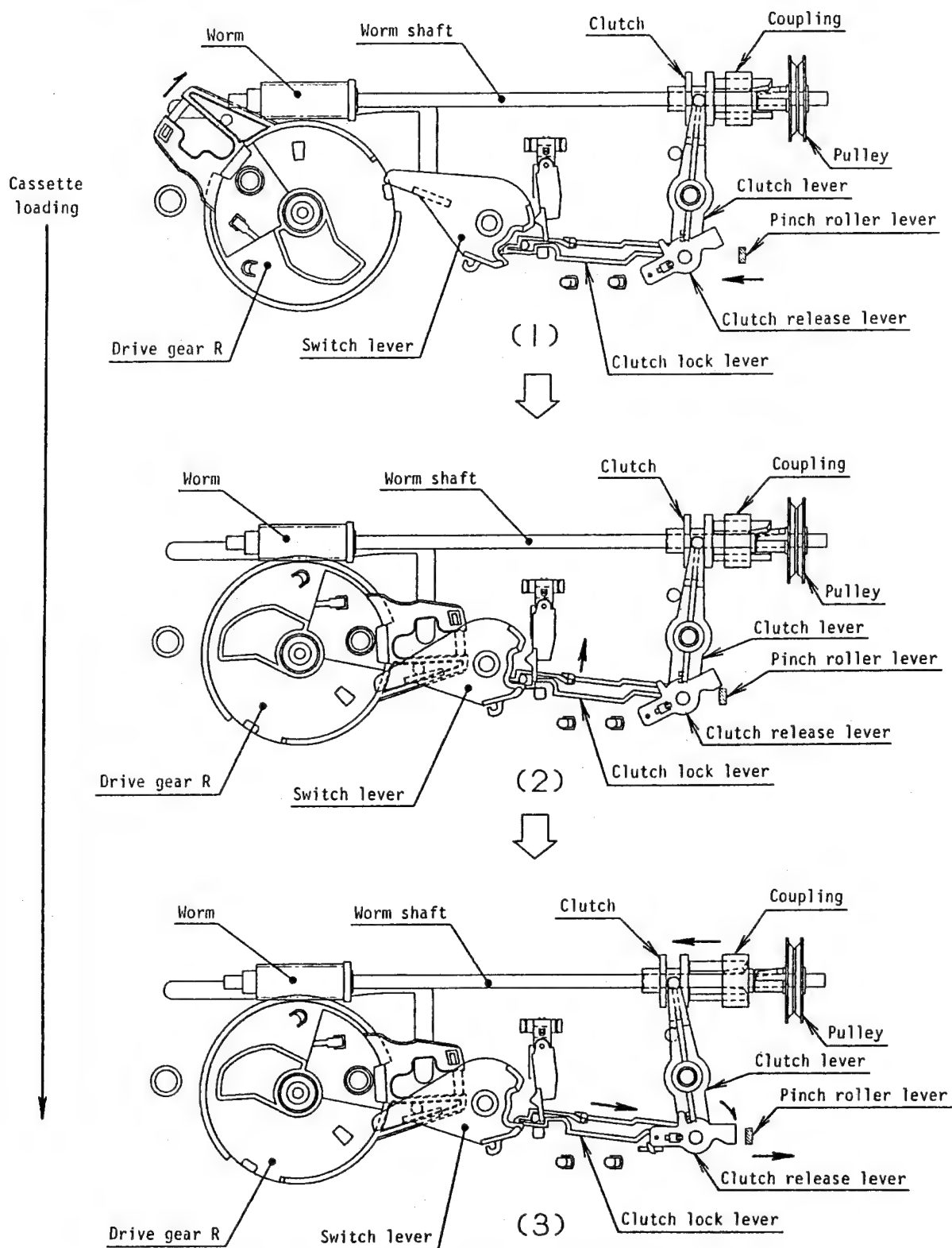


Figure 1-26. Clutch Shifting Sequence during Cassette Loading

1) Clutch Shifting Sequence during Cassette Unloading

The clutch is located as shown in Figure 1-25.(1) when the cassette has been loaded. In this condition the driving force of the pulley is not transmitted to the worm. As the pinch roller lever moves in the direction of arrow (a), the clutch, clutch lock lever and clutch release lever move in the directions (b), (c) and (d), respectively, bringing the positional relation in Figure 1-25.(2).

Now the driving force of the pulley is transmitted through the clutch and the coupling to the worm, which starts the drive gear R to unload the cassette.

At this time, the clutch lock lever is released from the switch lever and then fixed to the projection on the frame. By this the clutch is kept at a position even when the pinch roller lever comes to the position shown in Figure 1-25.(3).

When the drive gear R rotates to the position shown in Figure 1-25.(3), the switch lever turns on the switch and the motor stops. Now the cassette has been completely unloaded.

2) Clutch Shifting Sequence during Cassette Loading

Before a cassette is inserted, the clutch is positioned as shown in Figure 1-26.(1), where the driving force of the pulley is transmitted to the worm through the coupling.

When the cassette is inserted in this condition, the drive gear R starts turning by the reciprocating mechanism. Then the switch is released from the switch lever and the pulley starts turning to move the cassette in the loading direction. When the mechanism reaches a position just before completion of loading as shown in Figure 1-26.(2), the drive gear R forces the switch lever to rotate. Consequently, the clutch lock lever moves in the direction of arrow (e), releasing the clutch and turning on the switch at a time. Now the mechanism has loaded the cassette in position (Figure 1-26.(3)). The pulley remains running idle, and even when the loading motor is running, its force is not transmitted to the cassette controller.

2. SERVO CIRCUIT

Digital servo LSI (RH-IX0431GEZZ)

The digital servo LSI is of single-chip type and has the following functions.

- Drum speed and phase control.
- Capstan speed and phase control.
- Gain control for recording speeds (SP/LP).
- Automatic tape speed detection in playback mode.
- Head switching pulse generation in 1 PG system.
- X-value compensation in double-azimuth 4-head fine slow motion.
- Drum compensation and tracking shift in trick play mode (slow, still, frame advance, etc.).
- Amplification of record control signal.
- Others.

Below discussed are the names and functions of the pins of RH-IX0431GEZZ.

Pin No.	Name	Input/Output	Function
1	Vcc (for Analog circuit)	—	Power input terminal for analog amplifier (5 ± 0.5V).
2	Bias (+) (VREF (+))	Input	Reference bias voltage (2.5 V) setting for analog amplifier and analog switch. Internally connected to the voltage follower input composed of C-MOS amplifier. 2.5 V reference voltage fed.
3	Bias (−) (VREF (−))	Output	Voltage follower output of the reference voltage fed at bias (+) (pin ②). Bias voltage of each amplifier inside the IC also connected to this pin.
4	Drum PG	Input	Negative drum phase generator pulse input. Threshold voltage is -70 mVp-p (TYP). Hysteresis is 60 mVp-p (TYP). (Positive square wave generated by the internal Schmitt amplifier)
5	Drum FG AMP	Input	Inverted input for inversion C-MOS amplifier of drum frequency generator. Bias preset at pin ② connected to this pin.
6	Drum FG AMP output	Output	Output terminal for inversion C-MOS amplifier of drum frequency generator.
7	Drum FG input	Input	Drum frequency generator Schmitt amplifier input terminal. Threshold voltage is 80 mVp-p (TYP). Hysteresis is 80 mVp-p (TYP).
8	Drum additional AMP output	Output	Additional amplifier output terminal for drum rotational control (C-MOS).
9	Drum additional AMP negative input	Input	Additional amplifier negative input terminal for drum rotational control (C-MOS).

Pin No.	Name	Input/Output	Function
10	Drum additional AMP positive input	Input	Additional amplifier positive input terminal for drum rotational control (C-MOS).
11	Capstan FG input	Input	Capstan frequency generator Schmitt amplifier input terminal. Both threshold voltage and hysteresis are 80 mVp-p (TYP).
12	Capstan additional AMP output	Output	Additional amplifier output terminal for capstan rotational control (C-MOS).
13	Analog SW2	—	Built-in analog switch turns on at the servo serial data D18 = "1" and off at D18 = "0". Internally connected with capstan additional amplifier output to control the additional amplifier gain and to short-circuit the phase compensating capacitor. Slow, still, FF/REW and capstan stop modes brought on at D18 = "1".
14	Capstan additional AMP negative input	Input	Additional amplifier negative input terminal for capstan rotational control (C-MOS).
15	Capstan additional AMP positive input	Input	Additional amplifier positive input terminal for capstan rotational control (C-MOS). (capstan speed and phase error voltages fed in)
16	GND (for Digital Circuit)	—	Ground for digital signal processing.
17	Drum phase error output (drum AFC)	Output	Drum phase error pulse width modulation (PWM) output terminal. Output at PWM repeated frequency $f_{sc}/2^6 \approx 69$ kHz. PWM duty stretched toward "H" due to phase delay. <ul style="list-style-type: none"> • Drum phase PWM output fixed at 50% duty if the drum frequency generator input frequency comes without about $\pm 5\%$ of the specified frequency.
18	Drum speed error output (drum AFC)	Output	Drum speed error PWM output terminal. Output at PWM repeated frequency $f_{sc}/2^6 \approx 69$ kHz. PWM duty stretched toward "H" due to speed (rpm) delay.
19	Capstan phase error output (capstan APC)	Output	Capstan phase error PWM output terminal. Output at PWM repeated frequency $f_{sc}/2^6 \approx 69$ kHz. PWM duty stretched toward "H" due to phase delay. Each capstan phase PWM output fixed at 50% duty in the following cases: 1) Drum frequency generator frequency out of about $\pm 10\%$ of the specified frequency.

Pin No.	Name	Input/Output	Function									
			2) Capstan frequency generator frequency out of about ± 5% of the specified frequency. 3) No control pulse. 4) In serial data input mode for FF/REW, slow, short rewind (ASB*REV).									
20	Analog SW 1	Output	Built-in analog switch turns on at the servo serial data D18 = "1" and off at D18 = "0". Bias voltage fed out of pin ③ when the switch turns on. Slow, still, FF/REW and capstan stop modes brought on at D18 = "1".									
21	Capstan speed error output (capstan AFC)	Output	Capstan speed error PWM output terminal. Output at PWM repeated frequency $f_{sc}/2^6 \approx 69$ kHz. PWM duty stretched toward "H" due to speed down.									
22	fsc (4.43 MHz) input	Input	4.43 MHz sub-carrier input terminal (C-MOS). Minimum operating compensation level at over 200 mVp-p. Inverting amplifier built-in.									
23	LP mode (H)	Output	Tape speed detection logic output terminals for LP and SP modes (C-MCS output). <table><tr><th>Tape speed Output terminal</th><th>LP</th><th>SP</th></tr><tr><td>LP (H) : PIN ②③</td><td>H</td><td>L</td></tr><tr><td>SP (H) : PIN ②④</td><td>L</td><td>H</td></tr></table>	Tape speed Output terminal	LP	SP	LP (H) : PIN ②③	H	L	SP (H) : PIN ②④	L	H
Tape speed Output terminal	LP	SP										
LP (H) : PIN ②③	H	L										
SP (H) : PIN ②④	L	H										
24	SP mode (H)	Output										
25	Servo serial data input	Input	Servo LSI operation mode is set by these input terminals. 21-bit serial clock provided. Internal mode is set by identifying data bit "1" or "0"; data bit "1" and "0" at serial data with "H" and "L", respectively, at rising edge of serial clock. Serial transfer made with shift register. Internal transfer of 21-bit data made at serial data "H" at falling edge of serial clock. (See Servo Process Block Diagram (Fig. 3-19).)									
26	Servo serial clock input	Input										
27	PG mono-multi	Input	Mono-multi terminal for video/audio head switching pulse output timing. (Drum frequency generator and phase generator input signals, internally shaped into square wave, are used to generate phase generator mono-multi trigger pulse. By this pulse, the time constant of resistor and capacitor externally added is activated for time adjustment.)									

Pin No.	Name	Input/Output	Function
28	Video H-SW-P output	Output	Video head switching pulse output terminal. 1. Double-azimuth 4-head switching: Video head switching pulse output timing in SP mode delayed by 2H ($\cong 128 \mu\text{sec.}$) compared to that in LP mode. (Actual video heads are set up by 2H difference.)
29	Hi-Fi H-SW-P output	Output	Hi-Fi head switching pulse output terminal. 1. 2-head switching: Head switching pulse output 90° behind the video head switching pulse. 2. Double-azimuth 4-head switching: Head switching pulse 60° behind the video head switching pulse. (Not used on the models of this series.)
30	Vertical sync. input	Input	Composite sync. input detected for vertical sync. by the internal logic. Vertical sync. is distinguished from horizontal sync. by the pulse width.
31	Tracking monitor output	Output	Internal tracking delay time point monitored for digital tracking. • Monitor output stretched toward "H" duty when tracking data (servo serial data D0 thru D5 — 6 bits — used) is raised. (The center value is 20.0 msec. inside the IC; 14.78 msec. at this pin, however.)
32	Control pulse duty detection output	Output	Control pulse duty identify output terminal. "L" level when control pulse "H" duty (time from positive pulse to negative pulse) is long (about 60%). "H" level when it is short (about 27.5%). Control pulse identify duty fixed at 40% (TYP) in the IC.
33	Control pulse Schmitt output	Output	Output terminal of the control signal that has been fed through Schmitt amplifier and converted into square wave. "H" level square wave made with positive pulse and "L" one with negative pulse. Internal control pulse square wave inverted and put out when tape travel is reversed.
34	Vcc (for Digital Circuit)	—	Supply voltage input terminal for digital circuit ($5 \pm 0.5 \text{ V}$).
35	$\overline{\text{TEST}}$	Input	"H" input to make the servo IC in TEST mode. Usually at "H" level.

Pin No.	Name	Input/Output	Function																
36	Record control (–)	Output	Terminal to apply voltage to negative pole of control head in record mode. (High impedance in playback mode) • “L” level duty 27.5% at servo serial data D17=“1” and 60% at D17=“0”.																
37	Record control (+)	Output	Terminal to apply voltage to positive pole of control head in playback mode. (High impedance in playback mode) • “H” level duty 27.5% at servo serial data D17=“1” and 60% at D17=“0”.																
38	GND (for Analog Circuit)	—	Ground terminal for analog amplifier.																
39	AMP (+)	Input	C-MOS amplifier positive input terminal. Pulled with 37 kΩ (TYP) up to bias voltage at pin ③ inside the IC.																
40	AMP (–)	Input	C-MOS amplifier negative input terminal.																
41	AMP output	Output	C-MOS amplifier output terminal. C-MOS amplifier composed at pins ③⑨ and ④⑩. (Not used)																
42	Control pulse Schmitt input	Input	<p>Control pulse Schmitt amplifier input. Threshold voltage of schmitt amplifier system is controlled by the servo serial data D19 “0”, “1” and slow/still mode as shown below, and control pulse is given out from schmitt output (pin ③③).</p> <table border="1"> <tr> <th>Mode</th><th>D19 “0”</th><th>D19 “1”</th><th>Slow/still</th></tr> <tr> <th>Spec</th><td></td><td></td><td></td></tr> <tr> <td>Hysteresis</td><td>330mVp-p</td><td>650mVp-p</td><td>45mVp-p</td></tr> <tr> <td>Center level</td><td>0 mV</td><td>0 mV</td><td>110 mV</td></tr> </table> <p>Notes:</p> <ol style="list-style-type: none"> 1) The hysteresis of both the positive and negative pulses of control pulse are used at D19=“0” or “1”, in any other modes than slow/still. In slow/still mode, only the positive pulse peak is detected. 2) D19=“1” is in FF/REW and video search modes. 3) D19=“0” is in the other modes than above. 	Mode	D19 “0”	D19 “1”	Slow/still	Spec				Hysteresis	330mVp-p	650mVp-p	45mVp-p	Center level	0 mV	0 mV	110 mV
Mode	D19 “0”	D19 “1”	Slow/still																
Spec																			
Hysteresis	330mVp-p	650mVp-p	45mVp-p																
Center level	0 mV	0 mV	110 mV																

3. SYSTEM CONTROLLER LSI

- 2-head system: RH-iX0448GEZZ, RH-iX0491GEZZ
- 4-head system: RH-iX0449GEZZ

3-1. System Controller Terminal Allocation.

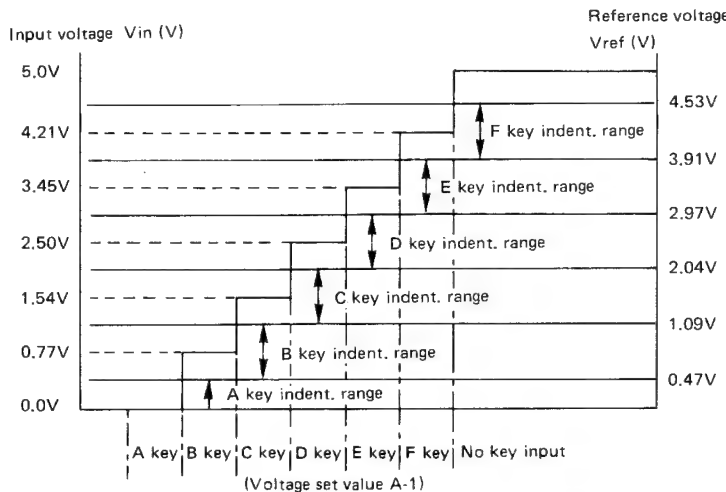
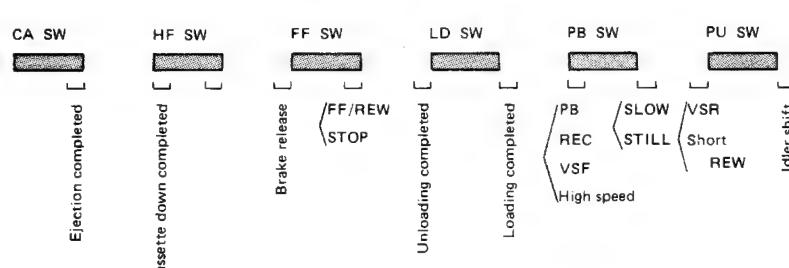
I/O	Terminal Name	Name	No.	No.	Name	Terminal Name	I/O
	GND	Vss	64	1	INT3	PB CTL	Input
Output	LOADING FWD CTL	P90	63	2	INT2	VISS IN	Input
Output	LOADING RVS CTL	P91	62	3	INT1	H.SW.P	Input
Output	BRAKE SOLENOID	P92	61	4	INT0	NC	Input
Output	CTL GAIN SW	P93	60	5	PTH3	CAM SW	(A/D) in
Input	DEW SENSOR	P80	59	6	PTH2	CASSETTE SW/REC TIP	(A/D) in
Input	REEL SENSOR	P81	58	7	PTH1	AUTO FUNCTION	(A/D) in
Input	START SENSOR	P82	57	8	PTH0	SPEED DET	(A/D) in
Input	END SENSOR	P83	56	9	T10	NC	Input
Output	NC	P70	55	10	T11	SYNC DET	Input
Output	NC	P71	54	11	P23	H.AMP SW	Output
Output	NC	P72	53	12	P22	CHROMA ROTARY	Output
Output	(-) GND CTL	P73	52	13	P21	BEEP	Output
Output	NC	P60	51	14	P20	S.T READY (L)	Output
3-value	FV	P61	50	15	si	T.S DATA	Input
I/O	FV M.M	P62	49	16	so	S.T DATA	Output
I/O	SLOW TRK M.M	P63	48	17	sck	T.S CLOCK	Input
Input	CLOCK IN	X1	47	18	INT4	ENVELOPE DET	Input
Output	CLOCK OUT	X2	46	19	P123	POWER CTL (L)	Output
Input	ACL (L)	ACL	45	20	P122	EE (L)	Output
Output	FV CTL	P50	44	21	P121	AUDIO MUTE (L)	Output
Output	NC	P51	43	22	P120	ALPB (L)	Output
Output	NC	P52	42	23	P133	BIAS CTL (L)	Output
Output	NC	P53	41	24	P132	NC	Output
Output	NC	P40	40	25	P131	VCR (L)	Output
Output	SERVO S.DATA	P41	39	26	P130	SEARCH (L)	Output
Output	SERVO S.CLOCK	P42	38	27	P143	COUNTER F/R	Output
Output	NC	P43	37	28	P142	CAPSTAN RVS (H)	Output
Output	NC	P30	36	29	P141	CAPSTAN PU (L)	Output
3-value	DRUM SPEED UP	P31	35	30	P140	CAPSTAN UL (L)	Output
3-value	CAPSTAN SPEED UP	P32	34	31	N.C.	NC	
3-value	CURRENT LMT	P33	33	32	Vdd	AT 5V	

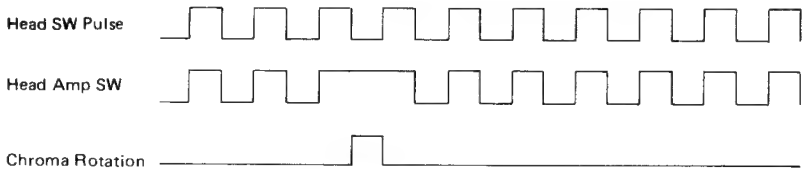
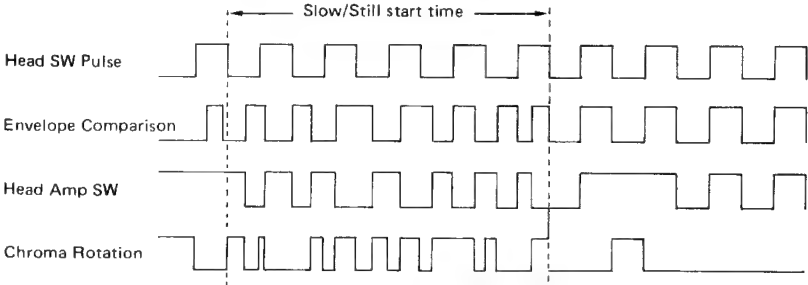
Figure 3-1. Bottom View

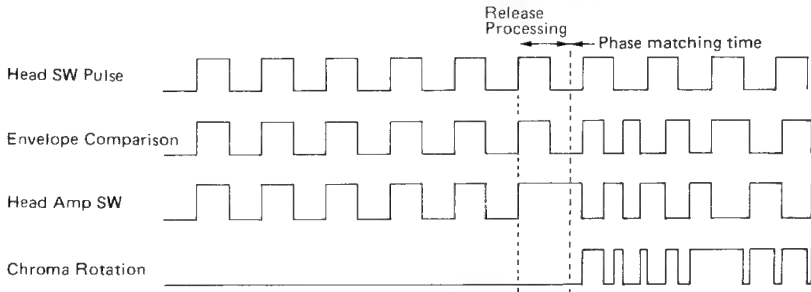
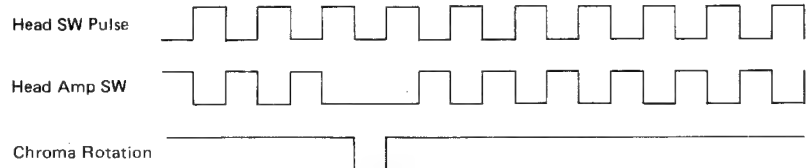
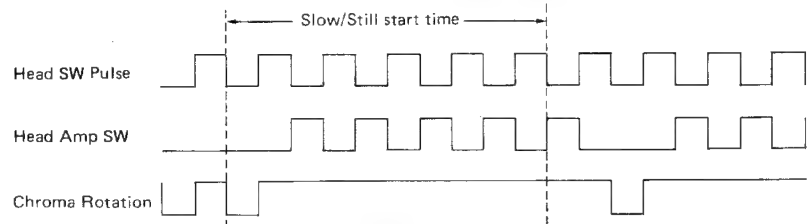
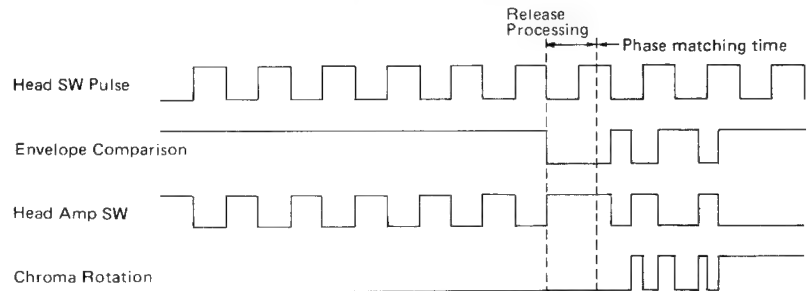
3-2. TERMINAL DESCRIPTION (2-/4-HEAD SYSTEM)

Pin No.	Control Signal	Specifications
1	PB CTL	<p>Reference signal taking playback blue mute</p> <p>(1) Unless PB CTL rising edge can be detected during 120 msec. in PB mode, a blue mute request is taken to the timer IC.</p> <p>(2) Ref. signal for determining a time (61 ± 2 pulses) of "Viss signal writing"</p> <p>(3) Detection signal for identifying a recorded tape (tab broken cassette) in Full Auto function</p> <ul style="list-style-type: none"> A signal causing reverse torque generation at frame advance
2	VISS IN	<p>This input is to detect cue signal in Viss mode.</p> <p>(1) "H" is inputted on cue recording section. (H to be 20 msec. min.)</p> <p>(2) By timer operation, Intro search (Interval search) and Index search are set.</p> <p>i) Setting of Intro search (Interval search)</p> <p>When the FF/REW key is pressed, it is shifted to Intro search.</p> <p>When the cue signal input "H" is detected during FF/REW mode, it comes to be PB mode during 7 sec. and is re-shifted to the FF/REW mode, continuing the cue signal input.</p> <p>ii) Release of Intro search (Interval search)</p> <p>When the mode is cleared by the timer, Intro search is released at once, continuing the current mode.</p> <p>When the mode key (STOP/FF/REW/PB/REC/SLOW/double speed key) is pressed during Intro search, the Intro search mode is released, allowing mode shifting.</p> <p>iii) Index search</p> <p>When the number of skips is set by Index search, the Viss signal is detected, and then it is transmitted to the timer IC by the system controller SIO.</p>
3	H.SW.P.	<p>Sensor input intended to detect the state of the drum to be rotated.</p> <p>(1) Head switching pulse to detect if the drum is running.</p> <p>(2) Drum remains running with drum speed-up at "Z" (high impedance) from loading start to unloading end.</p> <p>(3) If head switching pulse input stays in the state (2) above for 1.6 seconds, the head is stopped.</p> <p>It is the reference signal of FV output in trick mode (VSF/R, x 2, STILL/SLOW).</p> <p>(1) In trick mode, FV output is taken at the rising and trailing edges of HSW.P input (HSW.P).</p> <p>(2) A signal allowing start of frame advance.</p>
4	NC	To be connected to Vdd or GND
5	CAM SW	
6	CASSETTE SW/REC TIP	<p>This terminal has the A/D converting function of 6-resolution for analog voltage by the comparator (IC built-in) and D/A converter. (5 to 8)</p>
7	AUTO FUNCTION	

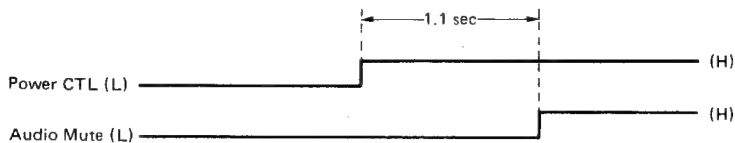
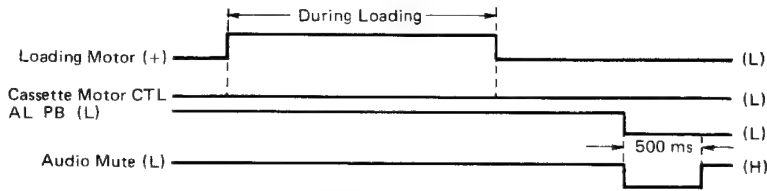
Pin No.	Control Signal	Specifications																																																			
8	SPEED DET	<div>Switches shown corresponding to A-F keys of D/A converting circuit</div> <table><thead><tr><th>Key</th><th>Input terminal</th><th>Mecha-posi. SW input</th><th>Speed detection input</th><th>Function selection input</th></tr></thead><tbody><tr><td>A</td><td></td><td>CA SW</td><td rowspan="2">SP mode</td><td>Variable speed VS/Auto OFF</td></tr><tr><td>B</td><td></td><td>HF SW</td><td>Variable speed VS/Auto Repeat</td></tr><tr><td>C</td><td></td><td>FF SW</td><td rowspan="4">LP mode</td><td>Fixed VS/Auto OFF</td></tr><tr><td>D</td><td></td><td>LD SW</td><td>Fixed VS/Auto Repeat</td></tr><tr><td>E</td><td></td><td>PB SW</td><td>Not used</td></tr><tr><td>F</td><td></td><td>PU SW</td><td>Not used</td></tr><tr><td>ALL SW "OFF"</td><td></td><td>SW OFF mode</td><td></td><td>Not used</td></tr></tbody></table> <div>Auto Power OFF: Auto power OFF function Auto Repeat: Auto repeat playback function</div> <div>Table 3-1.</div> <div>[Cassette controller SW]</div> <div>Refer to cassette controller circuit. (Fig. 3-2)</div> <table><thead><tr><th>Type SW</th><th>Cassette controller/Auto cassette controller</th><th>Specifications</th></tr></thead><tbody><tr><td>A</td><td>Cassette controller SW (Insertion start detection)</td><td>ON: Cassette insertion start OFF: Other than above</td></tr><tr><td>B</td><td>Auto load SW (Cassette fit-in state detection)</td><td>ON: Cassette fit-in state OFF: Non-auto load cassette controller or cassette not fitted in</td></tr><tr><td>C</td><td>REC. Tip SW (Mis-erasing preventive tab detection)</td><td>ON: Preventive tab broken OFF: Preventive tab present</td></tr><tr><td>D</td><td>(CAS. Unit fit-in state detection)</td><td><ul style="list-style-type: none">D-SW to be always "ON" at unit fit-in stateAll SWs to be "OFF" without unit</td></tr></tbody></table> <div>Table 3-2.</div> <div>D/A Converting circuit (Main body SW/CAM. SW/Function selecting SW/Cassette controller SW)</div> <div><p>Figure 3-2 (a).</p></div> <div><p>Figure 3-2 (b).</p></div>	Key	Input terminal	Mecha-posi. SW input	Speed detection input	Function selection input	A		CA SW	SP mode	Variable speed VS/Auto OFF	B		HF SW	Variable speed VS/Auto Repeat	C		FF SW	LP mode	Fixed VS/Auto OFF	D		LD SW	Fixed VS/Auto Repeat	E		PB SW	Not used	F		PU SW	Not used	ALL SW "OFF"		SW OFF mode		Not used	Type SW	Cassette controller/Auto cassette controller	Specifications	A	Cassette controller SW (Insertion start detection)	ON: Cassette insertion start OFF: Other than above	B	Auto load SW (Cassette fit-in state detection)	ON: Cassette fit-in state OFF: Non-auto load cassette controller or cassette not fitted in	C	REC. Tip SW (Mis-erasing preventive tab detection)	ON: Preventive tab broken OFF: Preventive tab present	D	(CAS. Unit fit-in state detection)	<ul style="list-style-type: none">D-SW to be always "ON" at unit fit-in stateAll SWs to be "OFF" without unit
Key	Input terminal	Mecha-posi. SW input	Speed detection input	Function selection input																																																	
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B		HF SW		Variable speed VS/Auto Repeat																																																	
C		FF SW	LP mode	Fixed VS/Auto OFF																																																	
D		LD SW		Fixed VS/Auto Repeat																																																	
E		PB SW		Not used																																																	
F		PU SW		Not used																																																	
ALL SW "OFF"		SW OFF mode		Not used																																																	
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Pin No.	Control Signal	Specifications
		 <p>Input voltage (Vin) VS. reference voltage (Vref) with each switch.</p> <p>Figure 3-2 (c).</p>  <p>Figure 3-2 (d).</p> <p>(CAM SW input)</p> <ul style="list-style-type: none"> Refer to Fig. 3-2 for L-mecha. mecha-posi. and mode. <p>(Cassette control SW/REC Tip input)</p> <ul style="list-style-type: none"> Timing of cassette insertion/Detection of REC. Tip state <p>(Cassette controller SW)</p> <ol style="list-style-type: none"> SW A detects start of cassette insertion in slider UP condition. SW B is intended for Auto load cassette controller and "ON" when the cassette is fitted in slider UP condition. For normal-type cassette controller, it is always "OFF". SW D is conceptual and always "ON" when the CAS. unit is fitted in. <p>(REC Tip SW)</p> <ol style="list-style-type: none"> It is "ON" at REC Tip broken and "OFF" at REC Tip present. It takes Eject immediately, if the "REC/timer REC" mode is to be started at REC Tip broken. (Tab-broken cassette/Auto-Eject function) <p>(Speed detection input)</p> <p>Input to detect a tape speed data of 4H/2H</p> <ol style="list-style-type: none"> Refer to the preceding para. of "A/D terminal description" for the relation between the recording mode and the voltage level to be inputted. The data inputted is transferred to the timer IC as below.

Pin No.	Control Signal	Specifications
		<p>i) In Stop/REC mode, the data of speed detection input is made ineffective, and the data of recording mode selected by timer is made to be a serial signal, transferred and displayed.</p> <p>ii) At replay by PAL 2HEAD, the following codes are transferred to the servo IC, instructed by "Audio 8CH spec. treatment" from the timer.</p> <ul style="list-style-type: none"> • SP mode (Speed identification permitted) at Audio 8CH spec. treatment • SP fixed (Speed identification prohibited) at Audio 8CH spec. no-treatment
9	NC	To be connected to Vdd or GND
10	SYNC DET	<p>It is an identifying terminal for weak electric field, being a signal to be outputted from the external Sync Det circuit for Hsync existence of input video signal.</p> <p>(1) For Hsync presence, it is weak electric field (L)="H". For Hsync not present, it is weak electric field (L)="L".</p> <p>(2) Input of weak electric field (L) is effective in case of EE (L)="L".</p> <p>(3) In case of EE (L)="L" (EE screen), if the weak electric field (L)="L" continues for 120 ms., it is to be a blue screen applied. (The timer IC takes OSD for application. However, that is only when the blue back ON/OFF SW is "ON".)</p> <p>(4) In Stop condition with PCON (L)="L", if the weak electric field (L)="L" continues for about 30 min., PCON (L)="H" is applied. (However, unless any execution instruction (T36) from timer IC is done, it is ineffective. At selection of Full Auto, T36="1".)</p>
11	H. AMP SW (4-head: iX0449GE only)	<p>Output to select between SP and LP heads.</p> <p>(1) SP mode: "H" LP mode: "L"</p> <p>(2) Head amplifier switching control signal at "L" in LP mode.</p> <p>(3) Inverted envelope comparison input signal (pin 18) to be outputted at VS-F/R in SP mode.</p> <p>(4) Signal to be outputted according to record mode of each step during slow/frame advance.</p> <p>(SP mode)</p> <ul style="list-style-type: none"> • This signal remains in phase with head switching pulse during frame advance.  <p style="text-align: center;">Figure 3-3.</p> <ul style="list-style-type: none"> • This signal remains in anti-phase with envelope comparison signal at the start of slow/still mode.  <p style="text-align: center;">Note: The envelope comparison signal here is typical one.</p> <p style="text-align: center;">Figure 3-4.</p>

Pin No.	Control Signal	Specifications
		<ul style="list-style-type: none"> The envelope comparison signal is inverted after the slow/still mode is cleared.  <p>Note: The envelope comparison signal here is typical one.</p> <p>Figure 3-5.</p> <p>(LP mode)</p> <ul style="list-style-type: none"> This signal remains in anti-phase with head switching pulse during frame advance.  <p>Figure 3-6.</p> <ul style="list-style-type: none"> The following timing is set up at the start of slow/still mode.  <p>Figure 3-7.</p> <ul style="list-style-type: none"> The envelope comparison signal is inverted after the slow/still mode is cleared.  <p>Note: The envelope comparison signal here is typical one.</p> <p>Figure 3-8.</p>
12	CHROMA ROTARY (4-head: iX0449GE only)	<p>Terminal to select chroma.</p> <p>(1) Right channel: "H" (6° azimuth head side).</p> <p>(2) EXOR logic for head switching pulse and head amplifier switching signal.</p>

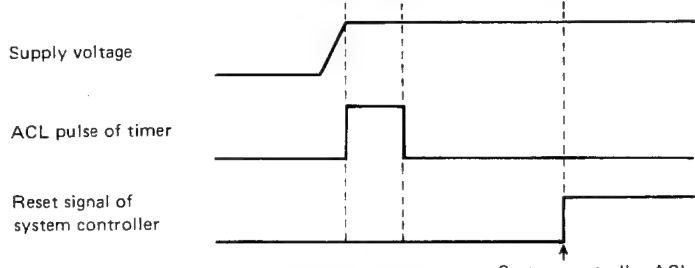
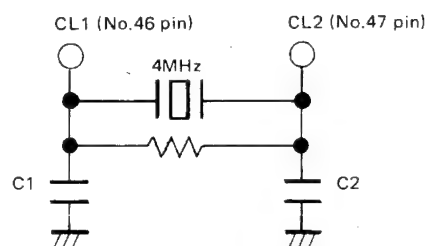
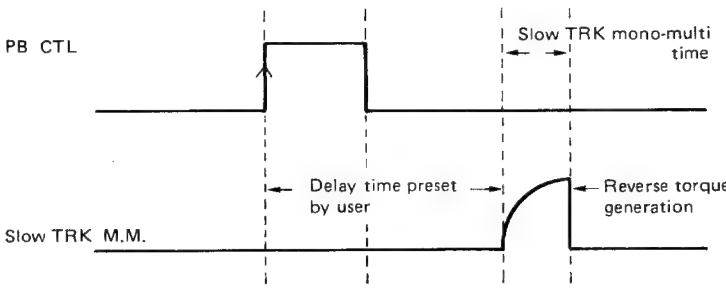
Pin No.	Control Signal	Specifications
13	BEEP	<p>This output shows the time of confirmation sound output when the operating key is pressed.</p> <ul style="list-style-type: none"> • Confirmation sound "ON time" = "H" • Confirmation sound "OFF time" = "L" <p>[System controller]</p> <p>(1) The time of outputting a confirmation sound is 47 msec. (2) The timing of outputting a confirmation sound is to be at receiving of keys below.</p> <ul style="list-style-type: none"> • Power key • TV/VCR key • Eject key • Stop key • FF key • PB key • REC key • Pause key • REW key • Slow key • Double speed key • At Viss writing (optional writing) <p>[Timer]</p> <p>(However, the confirmation sound output is only when the timer serial data takes buzzer request.)</p> <p>(1) The time of outputting a confirmation sound is 47 msec. and 1 sec. (2) To output the 47 msec. confirmation sound, it is done when 47 msec. short sound buzzer 1 is present with the timer serial data. (Refer to the timer ref. material for the operating key outputting a short sound buzzer request.)</p> <ul style="list-style-type: none"> • For the time of confirmation sound, it is shorter than the above value at Slow/Still.
14	S.T READY (L)	Refer to Page 44.
15	T.S DATA	<p>It is a control signal intended for serial transfer between the timer IC and the system controller IC.</p> <p>(1) It should be timer READY (L) = "L" every 23.4 msec., and 8 bit x 5 byte transferring is taken.</p> <p>(2) For serial transfer, after timer READY (L) = "L" has been made, the system controller serial data is set by trailing edge of serial clock from timer IC, and the timer serial data is inputted by rising edge of serial clock. And then, after input of 8 bit data, it should be timer READY (L) = "H".</p> <p>(3) The time of timer READY (L) = "H" is 1.3 msec. min.</p> <p>(4) For serial data, refer to page 43.</p>
16	S.T DATA	
17	T.S CLOCK	
18	ENVELOPE DET (2-head: iX0449GE only)	<p>Reference signal for head amplifier/chroma rotary switching output. To be given out of the head amplifier module.</p> <p>(1) Used to control the head amplifier/chroma rotary switching output with the envelope comparison signal input as reference in each mode.</p>
19	POWER CTL (L)	<p>A signal to control the power (supply) (controlling a driving-system power)</p> <p>(1) When the Power key is pressed at Power "OFF", it should be PCON (L) = "L". However, in case of timer stand-by, the Power key should be ineffective.</p>

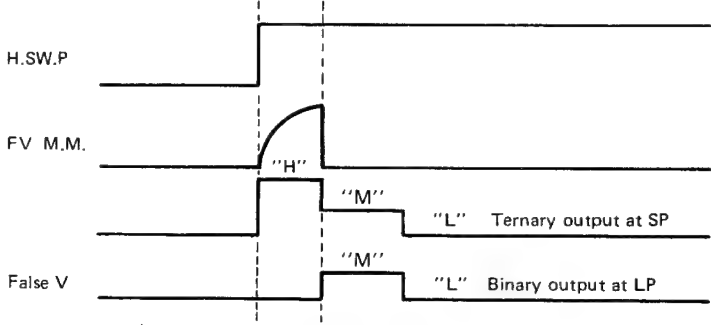
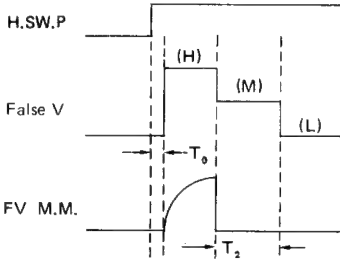
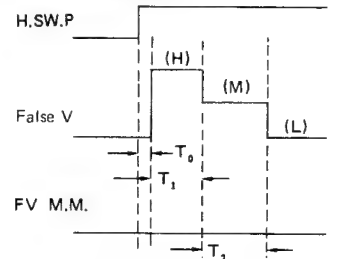
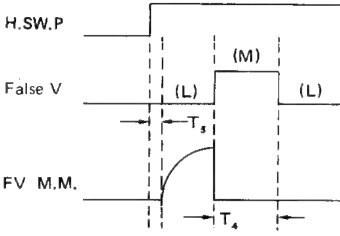
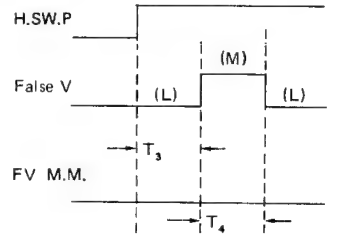
Pin No.	Control Signal	Specifications
		<p>(2) When the Power key is pressed in ON mode, it should be PCON (L) = "H". However, during mecha-operation, PCON (L) = "L" is continued, and PCON (L) = "H" is applied at the next mecha-position.</p> <ul style="list-style-type: none"> • Stop position • Slider Up position <p>(3) At timer stand-by, if the timer start data of timer serial data is detected, it should be PCON (L) = "L", making REC display. (Timer recording start)</p> <p>(4) At timer stand-by, it should be PCON (L) = "H". However, in VPS Interrupt mode, PCON (L) = "L" is applied.</p> <p>(5) For driving of loading motor, cassette motor or capstan motor, if PCON (L) = "H" is present, it should be made PCON (L) = "L", and after driving, it is made PCON (L) = "H".</p> <p>(6) In case of EE (L) = "L" and PCON (L) = "L", if weak electric field (L) input = "L" continues for 30 min., it is automatically to be PCON (L) = "H", allowing the mis-power-OFF preventive function to be effected.</p>
20	EE (L)	<p>A signal of selecting between EE screen and playback screen</p> <p>(1) The EE signal is intended to select the signal, i.e. the video/audio output is to be EE or PB, and thus in case of EE (L) = "L" it selects to the signal (EE screen) to be transmitted from the tuner, and also at EE (L) = "L" it selects to the signal (PB screen) to be transmitted from the video head.</p> <p>(2) At PB. REC position, if it is PB-system mode and EE (L) = "L", EE (L) = "H" is applied about 1 sec. after positive turn of capstan motor.</p> <p>(3) If the PB-system mode is released, it should be EE (L) = "L".</p>
21	AUDIO MUTE (L)	<p>A signal to stop any audio output</p> <p>(1) At Power CTL (L) = "H", it should be Audio mute (L) = "L" at any time.</p> <p>(2) For Power "ON":</p>  <p style="text-align: center;">Figure 3-9.</p> <p>(3) After PB loading end:</p>  <p style="text-align: center;">Figure 3-10.</p>

Pin No.	Control Signal	Specifications
		<p>(4) In PB mode, when the trick playback (Still, Slow, VSF, VSR & double speed) key is turned "ON", A mute (L)="L" is applied immediately, shifting to trick playback.</p> <p>(5) When trick playback is released, it is moved to the mecha-posi. of PB mode, and then after about 1,000 ms, A mute (L)="H" is applied.</p> <p>(6) When the PB mode is released with EE (L)="H" condition, A mute (L) should be ="L" for 500 msec.</p>
22	AL PB (L)	<p>A signal to select REC mode with PB mode</p> <p>(1) In case of PB-system mode (PB, Still, Slow, VS-F/R, double speed) at PB. REC position, AL PB (L)="L" is applied.</p> <p>(2) When the PB-system mode is released, it should be AL PB (L)="H".</p>
23	BIAS CTL (L)	A signal to control start/end of recording of video/audio signal
24	NC	Not used.
25	VCR (L)	<p>Control signal to switch on and off the signal to come to the RF converter.</p> <p>(1) Signal from the video tuner or playback signal from the video tape fed in with VCR (L) signal at "L".</p> <p>(2) Antenna input (VHF) signal fed through in with VCR (L) signal at "H".</p> <p>(3) VCR (L) signal at "H" with power control (L) signal at "H".</p> <p>(4) With power control (L) signal at "L", the TV/VCR selector key switches VCR (L) signal:</p> <ul style="list-style-type: none"> • From "H" to "L". • From "L" to "H". <p>(5) When the Stop key is pressed during playback mode, the following are obtained.</p> <p>i) If the VTR mode (L)="L" at output of playback screen, VTR mode (L)="L" is continued.</p> <p>ii) If the VTR mode (L)="H" at output of playback screen, VTR mode (L)="H" is continued.</p>
26	SEARCH (L)	<p>It is a control signal for selecting the gain of PB CTL signal.</p> <p>(1) In Video-Search F/R mode, it should be Search (L)="L".</p>
27	COUNTER F/R	<p>It is a control signal offering the tape running direction to the timer IC.</p> <p>(1) Counter CTL="H" : Reverse turn Counter CTL="L" : Positive turn</p> <p>(2) Other than the model below should be identical to the capstan motor direction. Namely, in case of capstan reverse turn "H", counter CTL="H" is applied.</p> <ul style="list-style-type: none"> • Cue sound countermeasures for FF/REW-Stop, etc. (Idler neck swing) • Idler neck swing • Inversion brake time for VS release <p>(3) In the mode below, the following are to be taken to adjust to the tape running direction. (For use of real time counter)</p> <ul style="list-style-type: none"> • At loading Counter CTL="L" • Eject position/Stop position Counter CTL="L"

Pin No.	Control Signal	Specifications												
28	CAPSTAN RVS (H)	<p>It is a control signal for determining the rotating direction of capstan motor.</p> <p>(1) The mode is made by combining the terminal ③④ with forced acceleration.</p> <table border="1"> <tr> <th>Mode \ Control signal</th><th>Forced acceleration</th><th>Capstan motor reverse turn</th></tr> <tr> <td>Capstan motor stop</td><td>L</td><td>L</td></tr> <tr> <td>Capstan motor positive turn</td><td>H</td><td>L</td></tr> <tr> <td>Capstan motor reverse turn</td><td>H</td><td>H</td></tr> </table> <p>Figure 3-3.</p>	Mode \ Control signal	Forced acceleration	Capstan motor reverse turn	Capstan motor stop	L	L	Capstan motor positive turn	H	L	Capstan motor reverse turn	H	H
Mode \ Control signal	Forced acceleration	Capstan motor reverse turn												
Capstan motor stop	L	L												
Capstan motor positive turn	H	L												
Capstan motor reverse turn	H	H												
29	CAPSTAN PU (L)	<p>A signal to control a reel rotating torque</p> <p>(1) The capstan PU is a signal for controlling the torque control voltage of capstan motor, and outputs at the following timing.</p> <ul style="list-style-type: none"> i) At transfer from PB. REC posi. to VSR posi. ii) At return from VSR posi. to PB/REC posi. iii) At idler move (Neck swing processing) iv) Idler move from tape-winding upon cassette insertion v) Idler move at REC—REC. Pause 												
30	CAPSTAN UL (L)	<p>A signal to control a reel rotating torque</p> <p>(1) The capstan UL is a torque control voltage to be applied to the capstan motor, and to be "L" during unloading, at start of FF/REW or at tape-winding at Eject.</p> <ul style="list-style-type: none"> i) If the Stop/FF/REW mode is obtained at PB. REC position, the loading motor is reversely turned, and after about 500 msec., capstan UL (L)="L" is made, and the capstan motor is reversely turned, stopping the capstan motor and capstan UL (L)="H" at brake release position. ii) When the FF key is pressed at FF. REW position, FF display is made, and after brake release, capstan UL (L)="L" is made, and the capstan motor is positive-turned and about 500 msec. later, capstan UL (L)="H" is applied. iii) When the REW key is pressed at FF. REC position, REW display is made, and after brake release, capstan UL (L)="H" is made, and the capstan motor is reversely turned and about 500 msec. later, capstan UL (L)="H" is applied. <p>(2) In tape slack detection or leader tape-winding processing, for start of tape running, about 500 msec. capstan UL (L)="L" is to be applied. However, if the above processing is completed within 500 ms., capstan UL (L)="H" is made immediately.</p> <p>(3) Idler move at start of loading action.</p> <p>(4) Loose-tape winding processing upon cassette insertion (300 msec.)</p> <p>(5) Loose-tape winding processing during Eject actuation.</p> <p>(6) Countermeasure for tape slack at FF→Stop</p>												
31	NC	NC Terminal												
32	AT 5V	Vdd terminal												

Pin No.	Control Signal	Specifications
33	CURRENT LMT	It is an output offering a torque (current) limit to the capstan motor. (1) In case of Power CTL (L)="L", current limit="L" is outputted. (2) For Power CTL (L)="L": i) At Still (still image) replay→Current limit="Z" ii) At Slow/Frame advance→Refer to frame advance timing chart. iii) For other than above, current limit="H" is outputted.
34	CAPSTAN SPEED UP (Forced acceleration)	It is an output accelerating (stopping) the rotation speed to the capstan motor. (1) For Slow/Still: i) At Still (still image) replay→Forced acceleration="H" ii) At Slow/Frame advance→Refer to a frame advance timing chart. 2) Other than Slow/Still i) Capstan motor rotation: Forced acceleration="Z" ii) Capstan motor stop: Forced acceleration="L"
35	DRUM SPEED UP	This signal is to control the drum motor rotation, and stops the drum motor in case of drum mute (L)="L". (1) If PB, VSR, VSF, Still, Slow, double speed or REC display is obtained at FF/REW position, drum mute (L)="Z" is applied, and after 500 ms, loading is started. (2) If Stop, FF or REW is obtained at PB/REC position, unloading is started, and after completion, drum mute (L)="L" is applied. (3) Lateral swing acceleration at Slow/Still→Refer to a frame advance timing chart.
36	NC	NC terminal NC Terminal should be open.
37	NC	NC terminal NC terminal should be open.
38	SERVO S. CLOCK	(1) The following are the method of data transfer to servo IC. The servo IC outputs the data of 21 bits to latch the servo/display serial data at rising edge of servo/display serial clock. Then, the serial output is completed by making servo/display serial data="H" at the final clock trailing edge. (2) For mode and data, refer to page 43.
39	SERVO S. DATA	
40	NC	NC terminal NC terminal should be open.
41	NC	Mode display IC output strobe signal (not used).
42	NC	NC terminal NC terminal should be open.
43	NC	NC terminal NC terminal should be open.
44	FV CTL	It is a control signal for APC correction of drum in trick mode. (1) In case of trick="H", drum correction is done. (2) At VS-F/R, double speed, slow & Still mode, trick="H" is made. (3) The timing of trick="L" is to be 1 sec. after phasing term after PB mode shifting.

Pin No.	Control Signal	Specifications
45	ACL (L)	<p>It is an initial resetting terminal of microcomputer, and allows the microcomputer to be initial-reset by applying the low voltage. In addition, with system controller reset signal, initial resetting is possible by connecting such a signal to the ACL terminal by the timer microcomputer. The timing of system controller reset signal on timer microcomputer is shown Fig. 3-11.</p>  <p style="text-align: center;">Figure 3-11.</p>
46 47	CLOCK OUT CLOCK IN	<p>The system clock generating circuit of microcomputer is built in, and the clock signal (4 MHz) is obtained by connecting the ceramic resonator shown Fig. 3-12.</p>  <p style="text-align: center;">Figure 3-12.</p>
48	SLOW TRK M.M	<p>It is intended to adjust the reverse torque generating timing at Slow/Frame advance.</p> <p>The preset is inputted to this terminal.</p> <p>(1) Normally, "L" is outputted.</p> <p>(2) At frame advance, when it detects the rising edge of PBCTL signal, it allows the delay time preset by user to pass by. Then, the terminal is selected to "Z" (High impedance) and such a mono-multi input started. When recognized as "H", the mono-multi input is stopped and the terminal to be "L".</p>  <p style="text-align: center;">Figure 3-13.</p>

Pin No.	Control Signal	Specifications
49	FV M.M	<p>It is intended to adjust the delay amount from the edge of H.SW.P to the generation of false vertical synchronous signal.</p> <p>(1) Normally, "L" is outputted.</p> <p>(2) After detection of H.SW.P edge, the terminal is made to be "Z" (High impedance) and the mono-multi input taken. When recognized as "H", the mono-multi input is stopped and the terminal to be "L".</p>  <p style="text-align: center;">Figure 3-14.</p>
50	FV	<p>In trick mode (VS-F/R), it generates FV/FH and applies the synchronization.</p> <p>(1) Such a FV is generated in VS-F/R mode, mecha. shift time of PB→VS-R, mecha. shift time at VS-R release, mode holding time of VS-F/R release Slow/Still, and in the case of Head 2 giving no double speed.</p> <p>(2) The generation timing waveform is as shown below. (Note: H.SW.P applies to both rising and trailing.)</p> <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>A mode (Variable-FV Ternary output)</p>  </div> <div style="width: 45%;"> <p>B mode (Fixed-FV Ternary output)</p>  </div> </div> <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>C mode (Variable-FV Binary output)</p>  </div> <div style="width: 45%;"> <p>D mode (Fixed-FV Binary output)</p>  </div> </div> <p>Note) M: High impedance</p> <p style="text-align: center;">Figure 3-15.</p>

Pin No.	Control Signal	Specifications																															
		<p>(3) Modes and output waveforms are listed below</p> <table><tr><th rowspan="2">Mode</th><th rowspan="2">Recording Mode</th><th colspan="2">Head SW Pulse</th></tr><tr><th>Rising</th><th>Trailing</th></tr><tr><td rowspan="2">VS-Forward/Reverse</td><td>2-head (SP)</td><td>D mode</td><td>D mode</td></tr><tr><td>4-head (SP) (LP)</td><td>B mode</td><td>B mode</td></tr><tr><td rowspan="2">Still/Slow</td><td>2-head (SP)</td><td>D mode</td><td>C mode</td></tr><tr><td>4-head (SP) (LP)</td><td>A mode</td><td>B mode</td></tr><tr><td rowspan="2">Double Speed</td><td>2-head (SP)</td><td>D mode</td><td>C mode</td></tr><tr><td>4-head (SP) (LP)</td><td>B mode</td><td>A mode</td></tr><tr><td></td><td></td><td>D mode</td><td>C mode</td></tr></table> <p>Table 3-4.</p>	Mode	Recording Mode	Head SW Pulse		Rising	Trailing	VS-Forward/Reverse	2-head (SP)	D mode	D mode	4-head (SP) (LP)	B mode	B mode	Still/Slow	2-head (SP)	D mode	C mode	4-head (SP) (LP)	A mode	B mode	Double Speed	2-head (SP)	D mode	C mode	4-head (SP) (LP)	B mode	A mode			D mode	C mode
Mode	Recording Mode	Head SW Pulse																															
		Rising	Trailing																														
VS-Forward/Reverse	2-head (SP)	D mode	D mode																														
	4-head (SP) (LP)	B mode	B mode																														
Still/Slow	2-head (SP)	D mode	C mode																														
	4-head (SP) (LP)	A mode	B mode																														
Double Speed	2-head (SP)	D mode	C mode																														
	4-head (SP) (LP)	B mode	A mode																														
		D mode	C mode																														
51	NC	NC terminals: Terminal processing should be open.																															
52	⊖ GND CTL	<p>It controls the (−) terminal of CTL head.</p> <p>(1) 100 ms after bias CTL (L) = "L", it should be GND CTL = "L". (At REC)</p> <p>(2) It should be bias CTL (H) = "H", together with GND CTL = "H".</p> <p>(3) Normally, it should be "H".</p>																															
53	NC	NC Terminal: Terminal processing is to be open.																															
54	NC	NC terminal: Terminal processing is to be open.																															
55	NC	NC terminal: Terminal processing is to be open.																															
56	END SENSOR	<p>A signal to detect a tape end</p> <p>(1) For detection of rising edge of end sensor input:</p> <p>i) In case of ON mode with cassette IN, auto-rewinding is taken.</p> <p>ii) During timer REC, Eject is taken after leader tape winding.</p> <p>(2) If in Stop mode, the tape is rewound and the leader tape wound until the end sensor input is "L". However, unless the end sensor input is "L" even after continuous rewinding for 5 sec., stop processing is taken.</p> <p>(3) Cassette-down is judged by the end sensor input and the next start sensor input as follows:</p> <p>(Cassette controller down). ((End sensor) + (Start sensor)) = "H"</p> <p>In such a case, cassette-down is recognized.</p>																															
57	START SENSOR	<p>A signal to detect a tape start</p> <p>(1) For detection of rising edge of start sensor input:</p> <p>i) In case of REW mode, stop processing is taken.</p> <p>ii) If during REC/PAUSE short rewinding, short rewinding is interrupted.</p> <p>(2) If in Stop mode, the tape is rapidly advanced and the leader tape wound until the start sensor input is "L". However, unless the start sensor input is "L" regardless of continuous rapid-advance for 5 sec., stop processing is taken.</p> <p>(3) The start sensor input is utilized for cassette-down recognition. Refer to the paragraph of end sensor input.</p>																															

Pin No.	Control Signal	Specifications								
58	REEL SENSOR	<p>It is a sensor input intended to detect the reel stand situation when it is to be turned.</p> <p>(1) The situation subject to a reel stand turn is as follows:</p> <p>i) For loading completion:</p> <ul style="list-style-type: none">• PB• REC• VSF• VSR• Double-speed <p>ii) For unloading completion:</p> <ul style="list-style-type: none">• FF• REW <p>(2) In such conditions, unless the reel sensor input changes within the time of each mode shown below, stop processing is taken.</p> <table><tr><th>Mode</th><th>Shut-Off Time</th></tr><tr><td>SP-PB/SP-REC/FF/REW/Double-speed/1.5-time speed</td><td>5.0 sec.</td></tr><tr><td>LP-PB/LP-REC</td><td>10.0 sec.</td></tr><tr><td>Video Search Rewind/Video Search Reverse</td><td>1.2 sec.</td></tr></table> <p style="text-align: center;">Table 3-5.</p> <p>(3) For processing of tape slack detection, the edge of reel pulse to be inputted utilizing the reel sensor is to be counted.</p>	Mode	Shut-Off Time	SP-PB/SP-REC/FF/REW/Double-speed/1.5-time speed	5.0 sec.	LP-PB/LP-REC	10.0 sec.	Video Search Rewind/Video Search Reverse	1.2 sec.
Mode	Shut-Off Time									
SP-PB/SP-REC/FF/REW/Double-speed/1.5-time speed	5.0 sec.									
LP-PB/LP-REC	10.0 sec.									
Video Search Rewind/Video Search Reverse	1.2 sec.									
59	DEW SENSOR	<p>An input terminal to detect any dew situation</p> <p>(1) When the dew sensor is equal to "H", it identifies as dew situation and prohibits any mecha. actuation. However, the following keys should be effective regardless of dew situation.</p> <ul style="list-style-type: none">• Power• Eject/Insertion• TV/VTR <p>(2) When the dew sensor is equal to "H", the mecha. position is moved to Eject position and done as follows:</p> <p>PCON (L)="L" Drum mute (L)="H"</p> <p>PCON (L)="H" Drum mute (L)="L"</p> <p>(3) When the dew sensor is equal to "L", the mecha. position is moved to Stop position.</p>								
60	CTL GAIN SW	<p>It is a gain selecting output of PB-CTL amp. at FF/REW.</p> <p>(1) At FF/REW→CTL gain selecting</p> <p style="padding-left: 40px;">CTL="H" output</p> <p style="padding-left: 40px;">Other than above→CTL gain selecting</p> <p style="padding-left: 40px;">CTL="L" output</p>								
61	BRAKE SOLENOID	<p>It is a signal for controlling the brake solenoid ON/OFF.</p> <p>(1) This signal is intended to control the brake solenoid ON/OFF, and in case of brake solenoid="H", the brake solenoid is made to be attracted.</p> <p>(2) When the REW key is pressed at FF.REW position, REW display is made, and it makes loading motor positive-turn CTL="L" and loading motor reverseturn="H", and after movement to brake release posi., brake solenoid="H" is applied.</p> <p>(3) When the FF key is pressed at FF.REW position, FF display is made and then the same brake release processing as (2) is taken.</p>								

Pin No.	Control Signal	Specifications												
		<p>(4) If the cassette is already inserted and end sensor="H" or start sensor="H" is present, the same brake release processing as (2) is taken.</p> <p>(5) In tape slack detection, it takes such a brake release processing identical to (2).</p> <p>(6) When the REW key is pressed in case of EE (L)="H" at PB.REC posi., VSR display is made and brake solenoid="H" made, shifting to the VSR position. After shifting, brake solenoid="L" is applied.</p> <p>Then, when the VSR mode is released, it makes brake solenoid="H" after stopping of tape running, and then upon shifting to PB.REC position, brake solenoid="H" is made.</p> <p>(7) In the item of (2), (3) and (4) of capstan UL, brake solenoid="L" is made immediately before capstan UL (L)="H".</p> <p>(8) It makes brake solenoid="L" immediately before release of FF/REW.</p>												
62	LOADING RVS CTL	(1) It is an output terminal for controlling the rotating direction of loading motor.												
63	LOADING FWD CTL	<p>Given below is the relevant combination.</p> <table border="1"> <thead> <tr> <th>Mode \ Control Signal</th><th>Loading motor positive-turn CTL</th><th>Loading motor reverse-turn CTL</th></tr> </thead> <tbody> <tr> <td>Loading motor Stop</td><td>L</td><td>L</td></tr> <tr> <td>Loading motor positive-turn</td><td>H</td><td>L</td></tr> <tr> <td>Loading motor reverse-turn</td><td>H</td><td>H</td></tr> </tbody> </table> <p style="text-align: center;">Table 3-6.</p> <p>(2) For stopping condition of mecha. actuation:</p> <ul style="list-style-type: none"> Loading motor positive-turn CTL="L" Loading motor reverse-turn CTL="L" <p>(3) The following functions are provided so as to prevent any over-current to the loading motor.</p> <ul style="list-style-type: none"> 2.0 sec. shut-off at cassette controller actuation 7.0 sec. shut-off at loading arm actuation <p>(4) For shut-off, there should be loading motor positive-turn CTL="L" and loading motor reverse-turn CTL="L", and the loading motor is stopped, and then stoppage is continued at that position until the operating key input has any change.</p> <p>However, if during positive-turn of cassette controller, the motor is reversely turned and the cassette is ejected at once.</p> <p>(5) Actuation of cassette controller</p> <p>i) In cassette insertion, unless the cassette controller moves to the cassette controller down-posi. within 2 sec., it is actuated in Eject direction immediately, and further if not moved to the cassette controller up-posi. within 2 sec., it takes shut-off.</p> <p>ii) For cassette controller Eject, unless the cassette controller moves to the cassette controller up-posi. within 2 sec., it is actuated in the cassette inserting direction, and if not moved to the cassette controller down-posi. within 2 sec., it takes shut-off.</p>	Mode \ Control Signal	Loading motor positive-turn CTL	Loading motor reverse-turn CTL	Loading motor Stop	L	L	Loading motor positive-turn	H	L	Loading motor reverse-turn	H	H
Mode \ Control Signal	Loading motor positive-turn CTL	Loading motor reverse-turn CTL												
Loading motor Stop	L	L												
Loading motor positive-turn	H	L												
Loading motor reverse-turn	H	H												
64	GND	<p>Vss terminal (GND)</p> <p>To be connected to GND</p>												

3-3. Data Transmission Specification of Mechanism Controller Corresponding to Serial Mode Servo

- Data is transmitted with the following format.

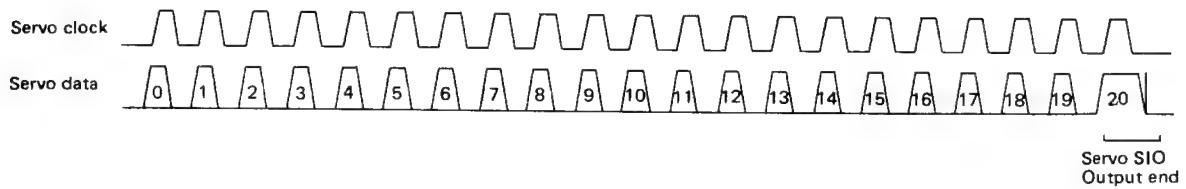


Figure 3-16.

- 21 bit data is outputted to the servo IC through the 2-line system consisting of servo clock (SCK) and servo data (SI).
- The servo data latches at the tail edge of servo clock. Servo SIO ends when the servo data is set to "H" at the servo clock tail.

1. Relation between Modes and Service Data

(The servo IC corresponds to RH-IX0431GEZZ)

Mode	Serial Data																
	0~5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
POWER OFF	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Serial transmission stop
POWER ON STOP	*1)	1	1	0	1	1	0	0	1	*2)	1	0	1	0	0		(FF2)
For 2.0S after FF start	*1)	1	1	0	1	1	0	0	0	*2)	1	0	0	1	0		(FF1)
FF subsequent	*1)	1	1	0	1	1	0	0	1	*2)	1	0	0	1	0		(FF2)
For 2.0S after REW start	*1)	1	1	1	1	1	0	0	0	*2)	1	0	0	1	0		(REW1)
REW subsequent	*1)	1	1	1	1	1	0	0	1	*2)	1	0	0	1	0		(REW2)
PB SP mode	*1)	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	(PB)
LP mode	*1)	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	(PB)
SP fixed mode	*1)	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	(PB)
VSF (M)	*1)	1	1	0	1	0	0	0	0	*2)	1	0	0	1	0		(SER2) SP: *5, LP: *5
(H)	*1)	1	1	0	1	0	0	1	0	*2)	1	0	0	1	0		(SER3) SP: *7, LP: *7
VSR (M)	*1)	1	1	1	1	0	0	0	0	*2)	1	0	0	1	0		(SER2/R) SP: *5, LP: *5
(H)	*1)	1	1	1	1	0	0	1	0	*2)	1	0	0	1	0		(SER3/R) SP: *7, LP: *7
SLOW	*1)	1	1	0	1	1	1	0	0	1	1	1	0	1	0	0	(SLOW)
STILL	*1)	1	1	0	0	0	0	0	0	1	1	1	0	1	0	0	(SLOW)
High speed	*1)	1	1	0	0	1	1	0	0	*2)	1	0	0	0	0	0	(* 2)
REC SP mode	*1)	0	0	0	0	0	0	0	0	1	0	1	*3)	0	0	0	(REC)
LP mode	*1)	0	0	0	0	0	0	0	0	0	1	1	*3)	0	0	0	(REC)
SP fixed mode	*1)	0	0	0	0	0	0	0	0	0	0	1	*3)	0	0	0	(REC)
REC/pause	*1)	0	1	0	0	0	0	0	0	*2)	1	0	1	0	0		(REC · ASB)
Loading	*1)	0	1	0	0	0	0	0	0	*2)	1	0	1	0	0		(REC · ASB)
Unloading	*1)	1	1	0	1	1	0	0	1	*2)	1	0	0	0	0		(FF2)
Short loading	*1)	1	1	0	1	0	0	0	0	*2)	1	0	0	1	0		(SER1) / (* 2)
Short unloading	*1)	1	1	0	0	0	0	0	0	*2)	1	0	1	0	0		(PB)
Trick cancel	*1)	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0	(PB)
Short rewinding	*1)	0	1	0	0	0	0	0	0	*2)	1	0	0	0	0		(REC · ASB)
Phase matching	*1)	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	(REC · ASB)

Note *1 : Tracking delay time
D0 to D5 = "1 0 0 0 0 0" only in REC mode
In other modes the preceding data remains.

Note *2: SP : 1 0
LP : 0 1
SP fixed : 0 0
Holding : 1 1

Note *3 : Only when writing the VISS signal: "1"
In other cases: "0"

Table 3-7.

2. Serial data D0 to D5

Serial Data						Tracking Delay time (msec)
0	1	2	3	4	5	
0	0	0	0	0	0	5.22
		↓				↓
0	1	1	1	0	1	18.62
		↓				↓
1	0	0	0	0	0	20.00
		↓				↓
1	1	1	0	1	0	32.01
		↓				↓
1	1	1	1	1	1	34.32

Note: The output from pin (31) of the servo IC (RH-IX0431GEZZ) is delayed by 5.22 msec.

Table 3-8.

3. Serial data D14 to D15

Serial Data		Speed Data
14	15	
1	0	SP
0	1	LP
0	0	SP fixed
1	1	Holding

Table 3-9.

4. Serial data D16 to D20

D16	Head Selection
0	D/A 4 Head
1	2 Head

D17	REC / DUTY Selection
0	REC · CTL 27.5%
1	REC · CTL 60 %

D18	CAP / SERVO SW
0	ANALOG SW ON
1	ANALOG SW OFF

D19	Hysteresis Width
0	300mVpp
1	600mVpp

D20	REC / CTL Selection
0	High-Z
1	GND

Table 3-10.

3-4. Serial Transmission Format between System Controller and Timer

1. Format of Data Transmitted from System Controller to Timer

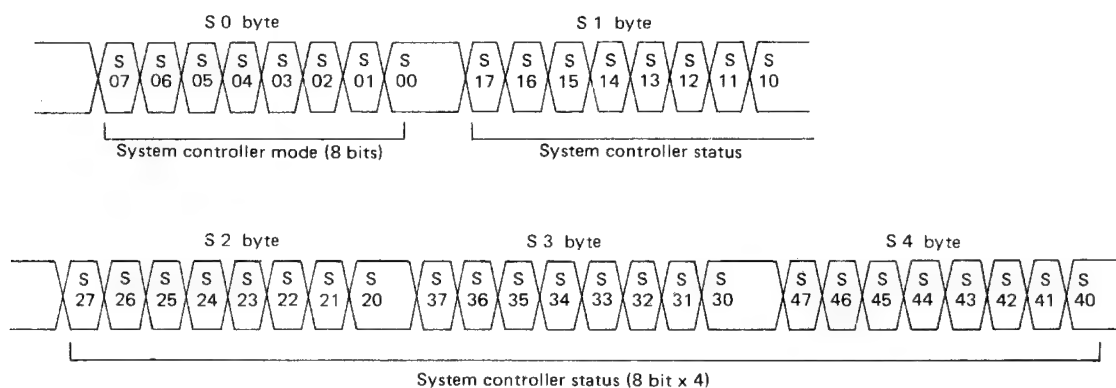


Figure 3-17.

- (1) 5-byte data is transmitted by one transmission sequence.
- (2) The S0 byte is arranged so that 8 bits compose one system controller mode data.
- (3) The system controller mode is the system controller operation modes.
- (4) The S1, S2, S3 and S4 bytes are 8 bite data which are used as system controller status data.
- (5) The content of system controller status is represented the status of pertinent sensor by each bit.
- (6) The timer makes the data valid when the same data is received twice successively (for S0, S1, S2, S3, S4).

2. Format of Data Transmitted from Timer to System Controller

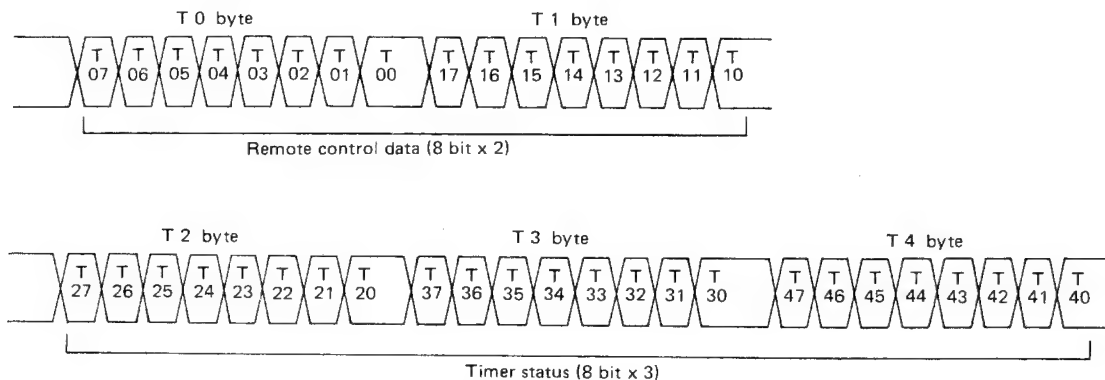
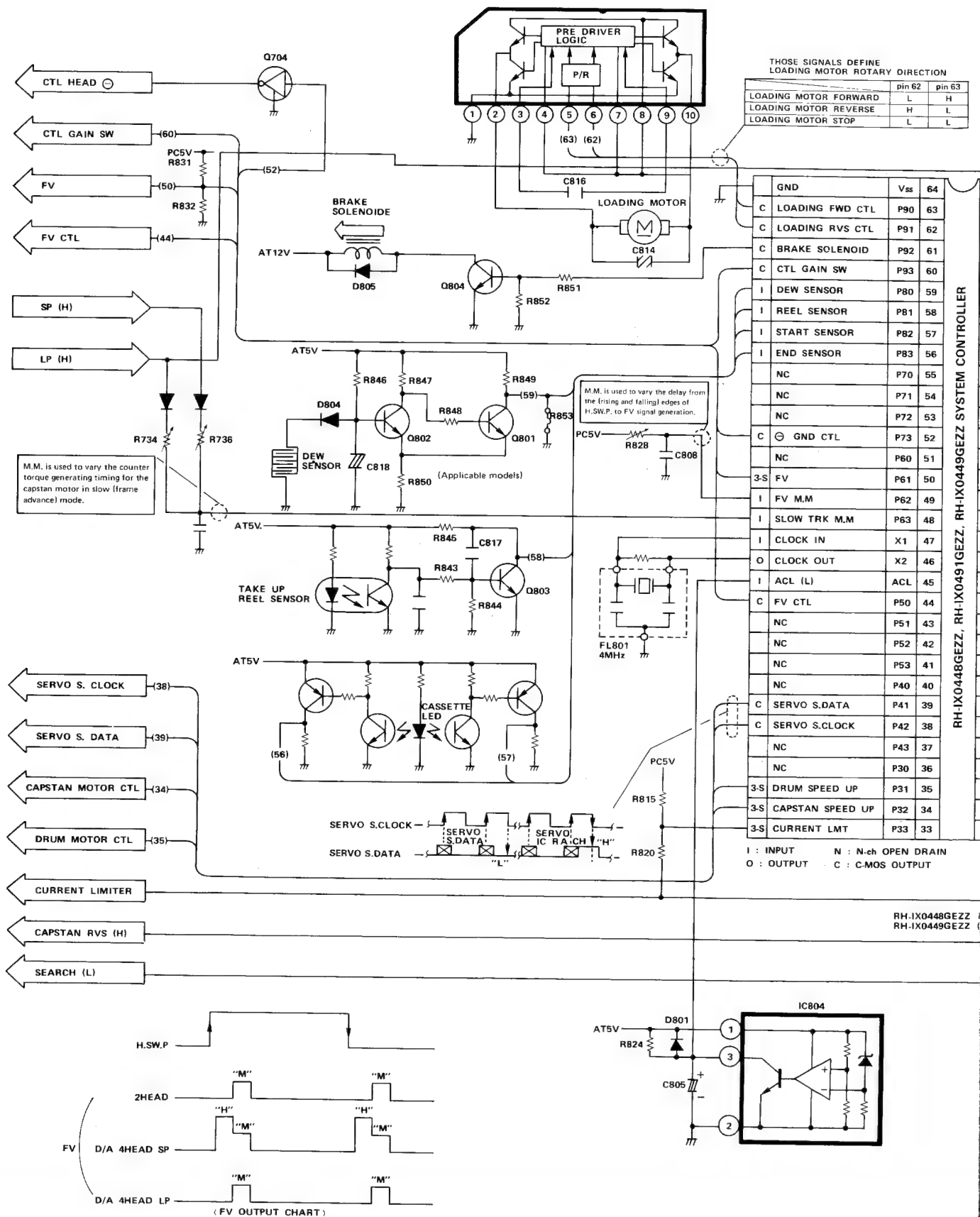


Figure 3-18.

- (1) 5-byte data is transmitted by one transmission sequence.
- (2) T0 byte and T1 byte are 8 bit data which are used as remote control data.
- (3) The remote control data and they are determined by the content of control signals from the optical remote control and timer.
- (4) The T0 byte and T1 byte have always the same data content.
- (5) The system controller makes the remote control data valid if the T0 byte and T1 byte match with each other.
- (6) The T2, T3 and T4 bytes are time master status data. The timer status consists of 8-bit flag it represents the timer status.
- (7) The system controller makes the timer status data valid when the same timer status data is received twice successively.

VC-A111,A105,A114,A211,
A244,T212,T310,T410,
VC-A505,A605,T510 Series

System Controller Block Diagram



Figure

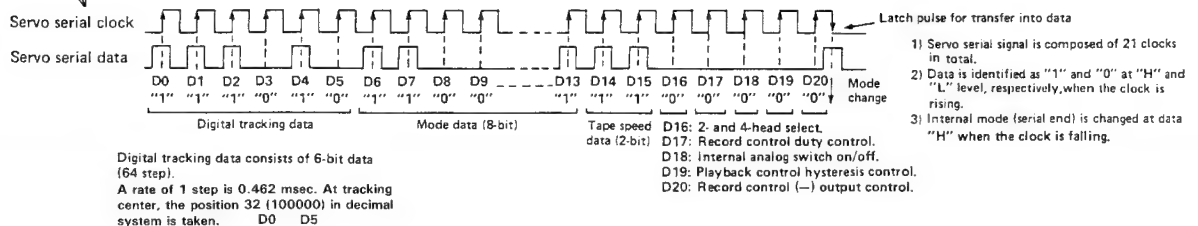
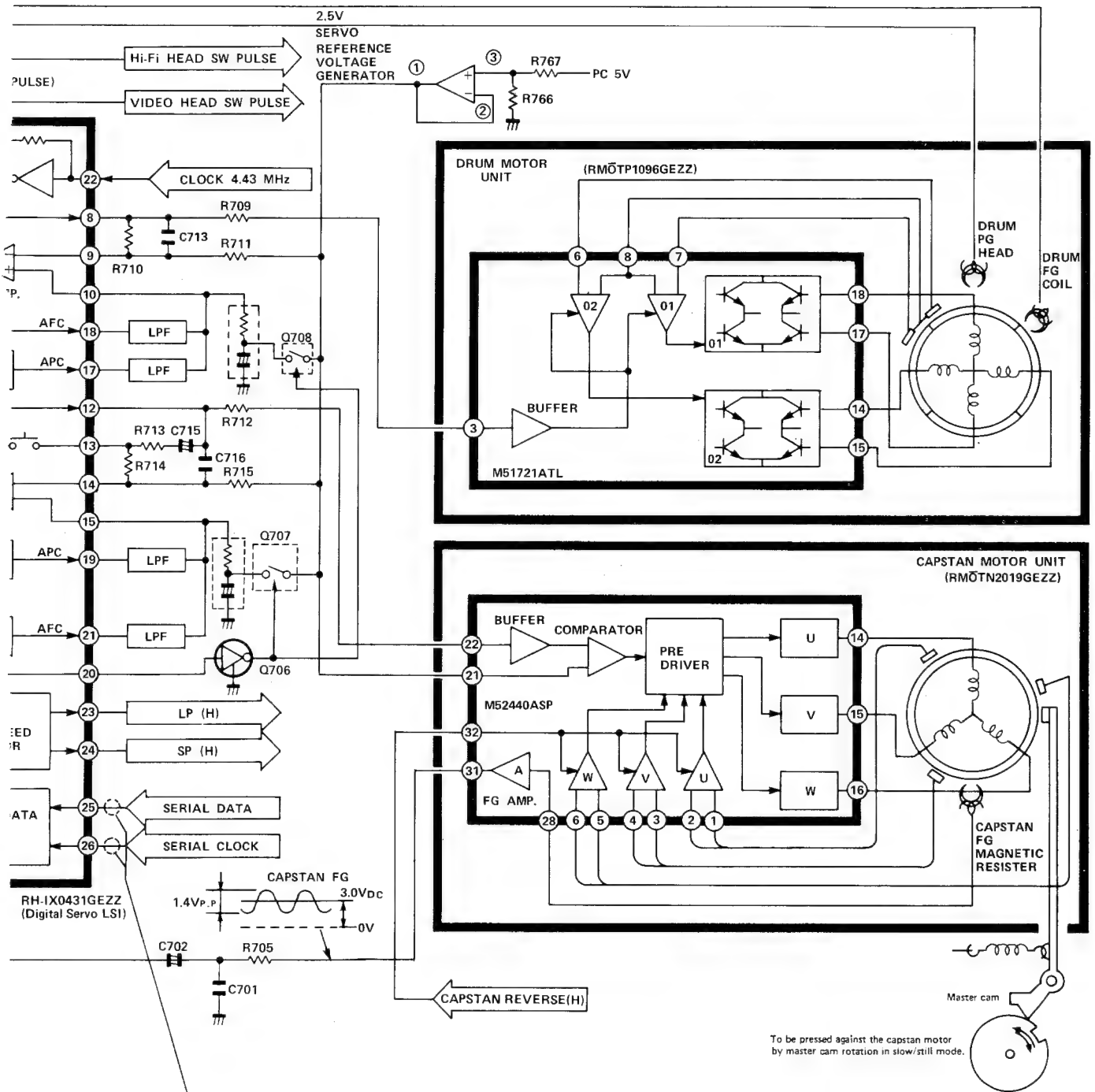
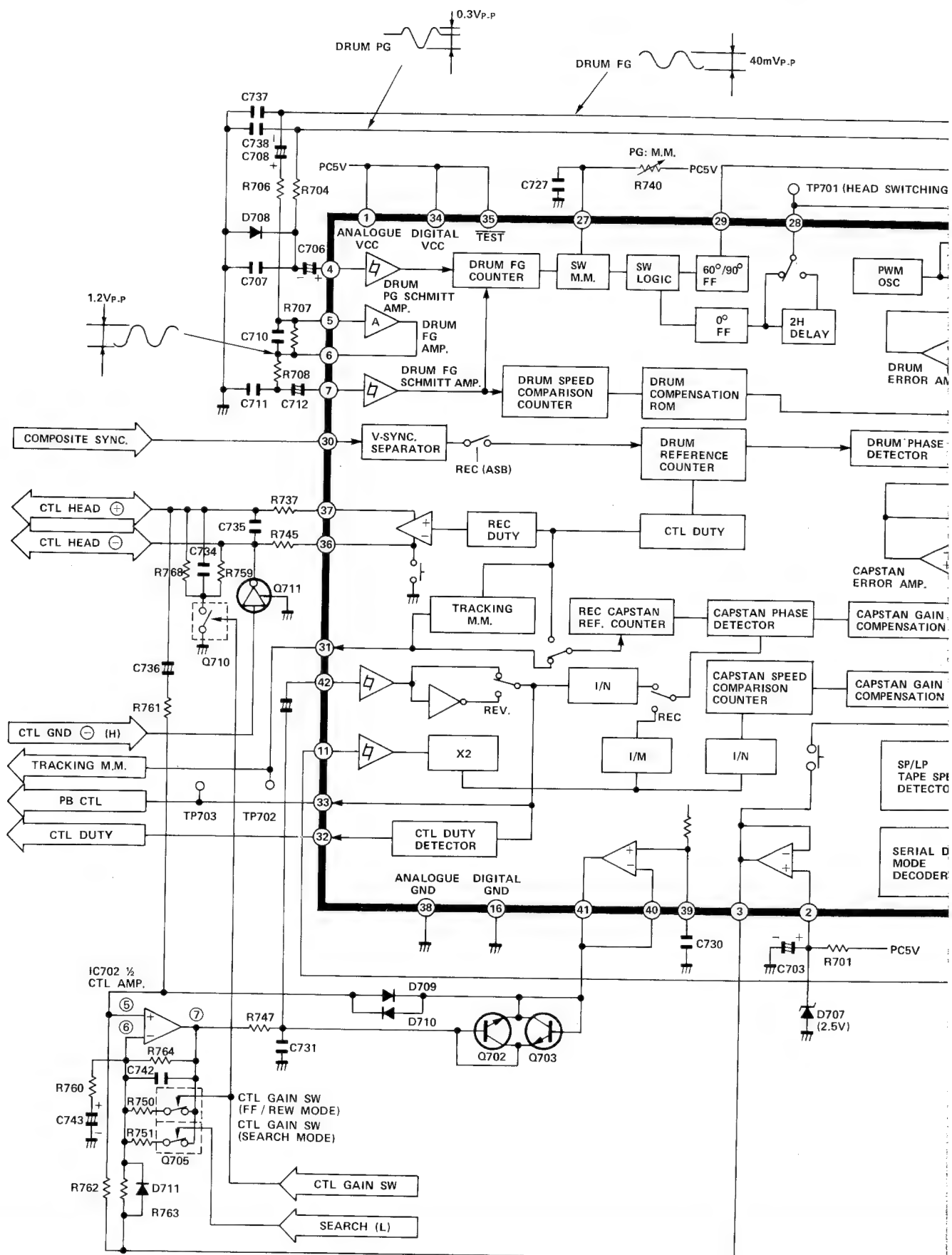
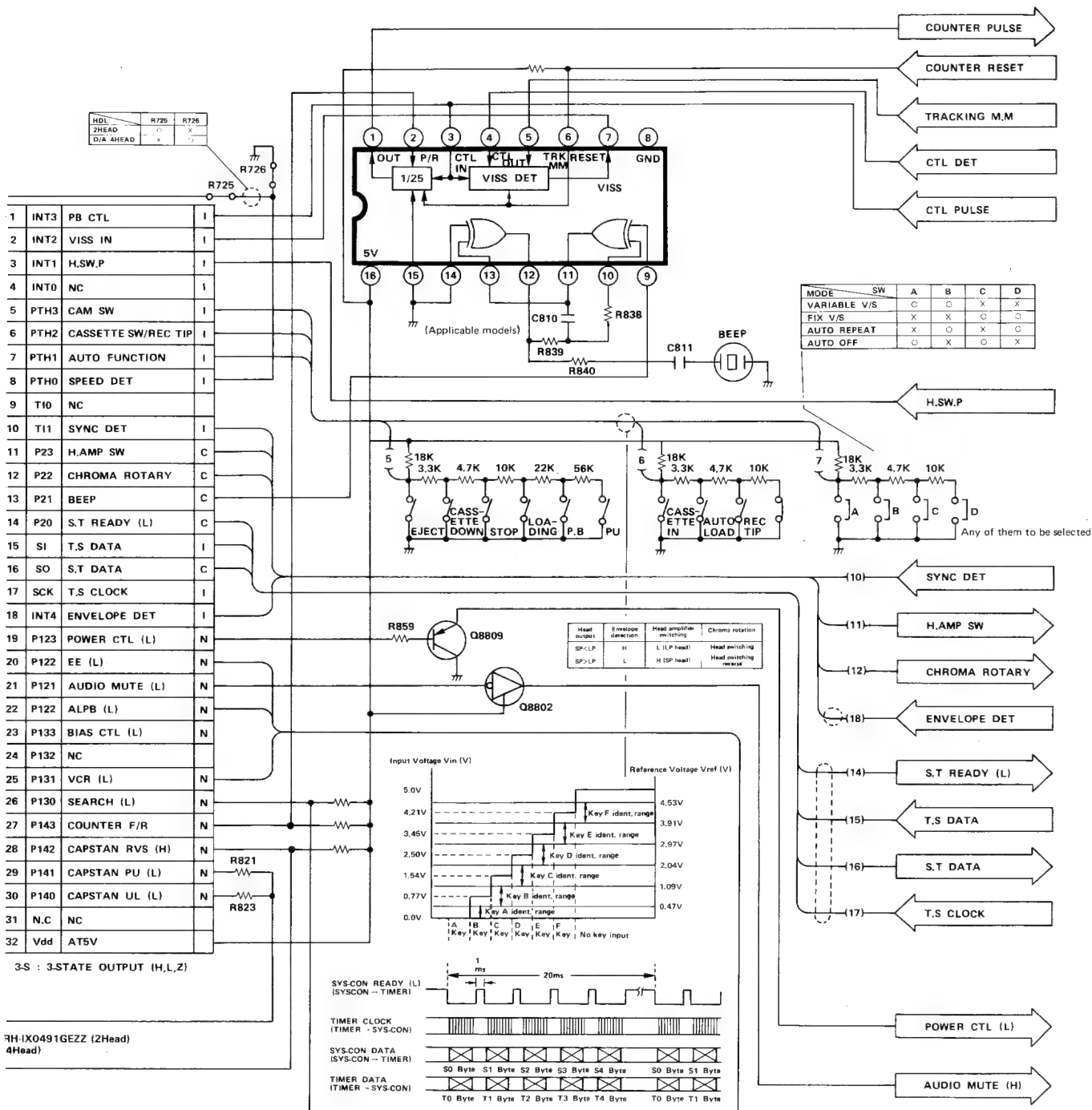


Figure 3-19.

Servo Process Block Diagram



Fig



4. TIMING CHART

Slow/Still Frame Advance Timing Chart (2-head system)

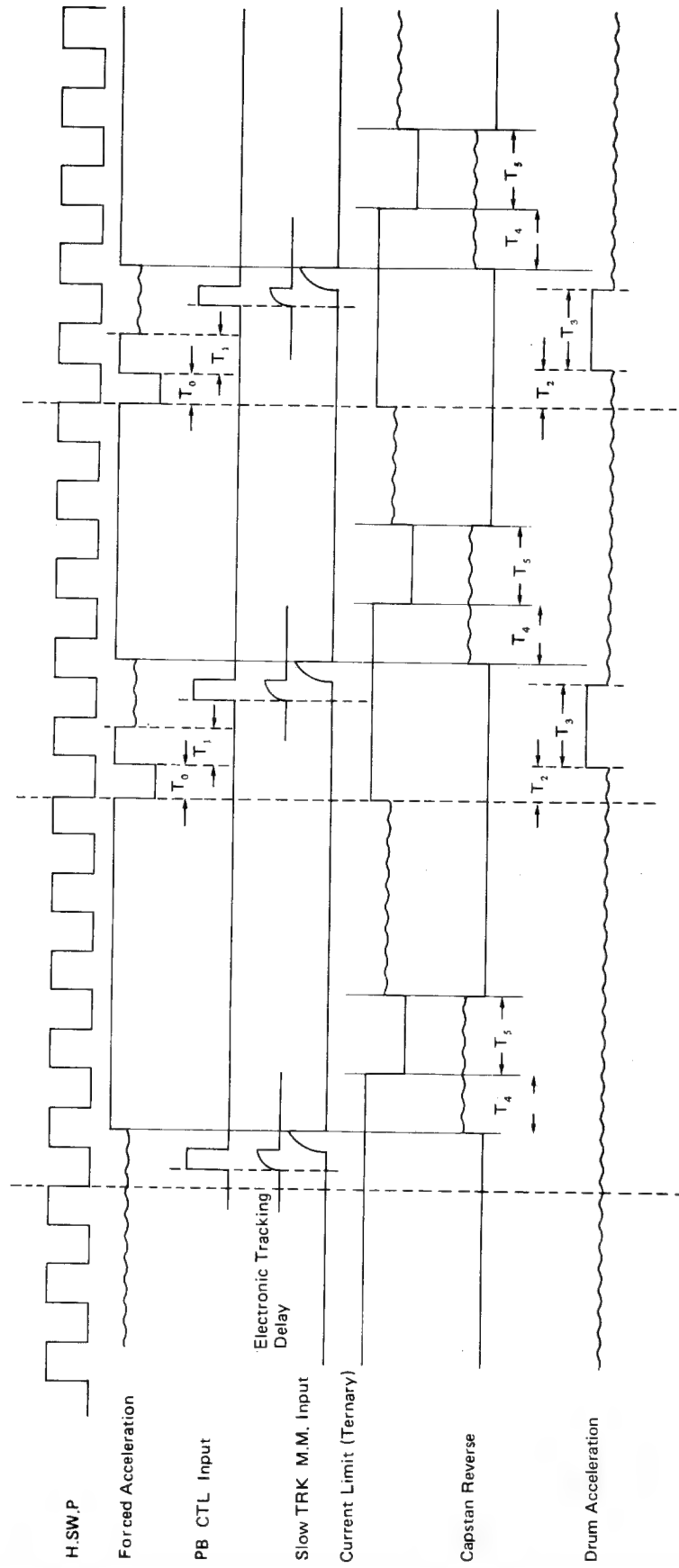


Figure 4-1.

Shift to REC/STOP mode when the Slow/Still mode is cleared (2-head system)

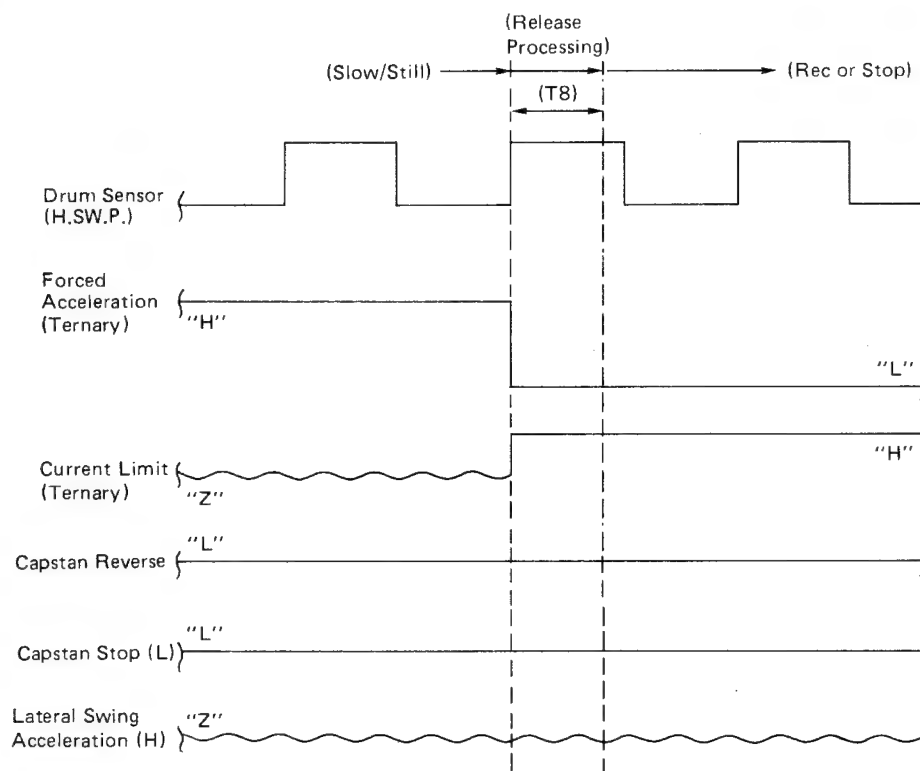


Figure 4-2.

Shift to PB mode when the Slow/Still mode is cleared (2-head system)

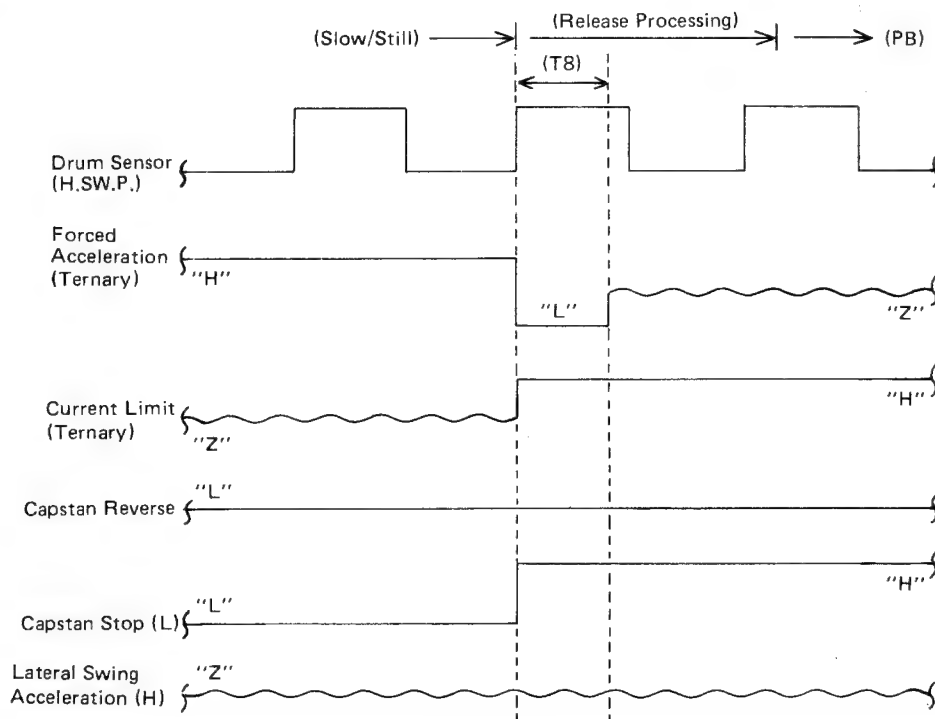


Figure 4-3.

Symbol		Item	Preset Value		
			SP	LP	
Frame Advancing	T0	Start M/M	13.8 ms	—	
	T1	Forced acceleration M/M	16.6 ms	—	
	T2	Lateral swing acceleration start time	18.7 ms	—	
	T3	Lateral swing acceleration M/M	45.8 ms	—	
	T4	Speed reduction M/M	12.0 ms	—	
	T5	Brake M/M	13.6 ms	—	
	T6	—	—	—	
	T7	—	—	—	
Release	T8	Forced acceleration release	23.0 ms	—	
	T9	—	—	—	

Note: Head 2 is special for SP; therefore, Slow/Still M/M, etc. of LP is under study.

Figure 4-1.

Slow/Still Frame Advance Timing Chart (4-head system)

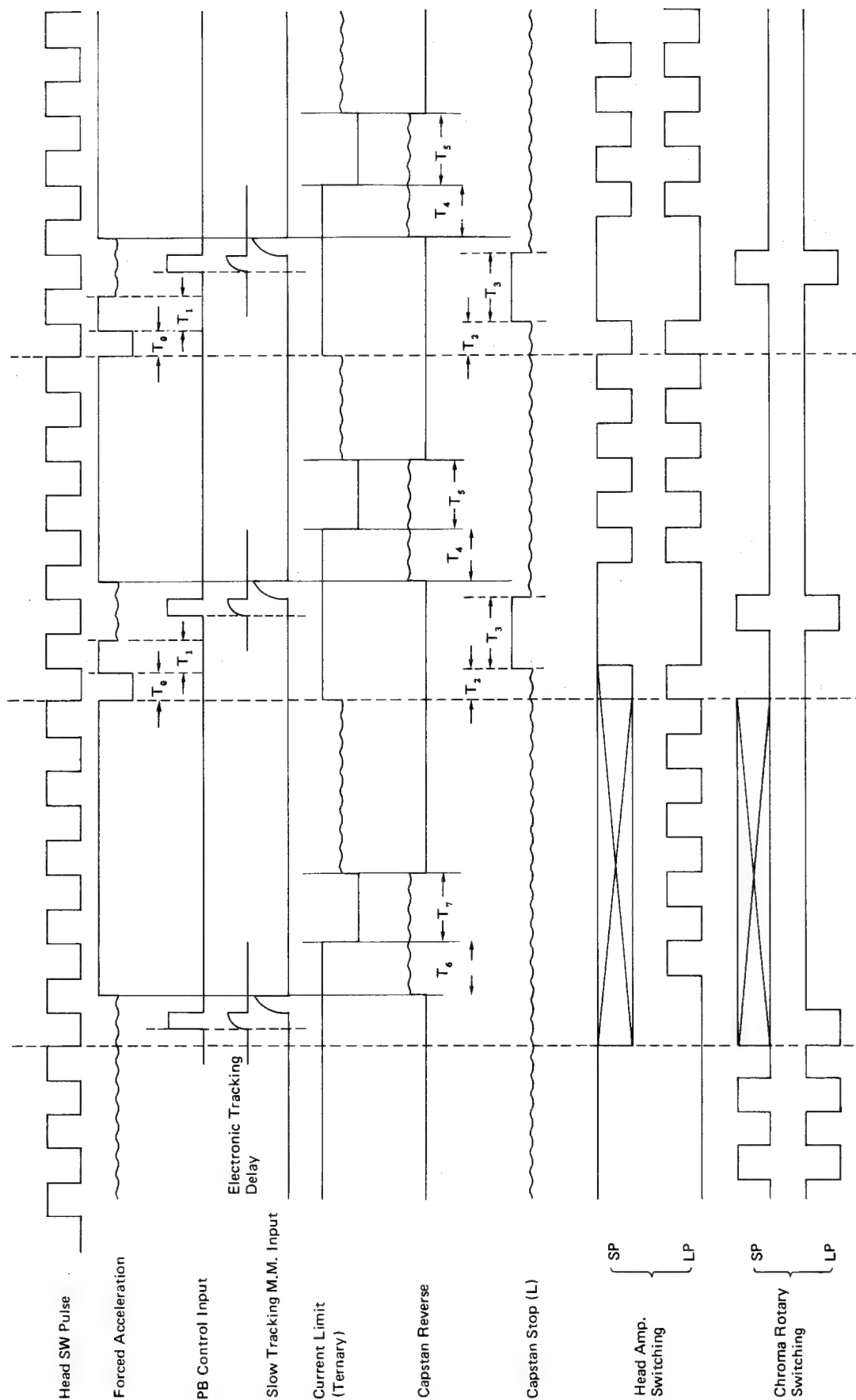


Figure 4-5.

Shift to PB mode when the SP Slow/Still mode is cleared
(4-head system)

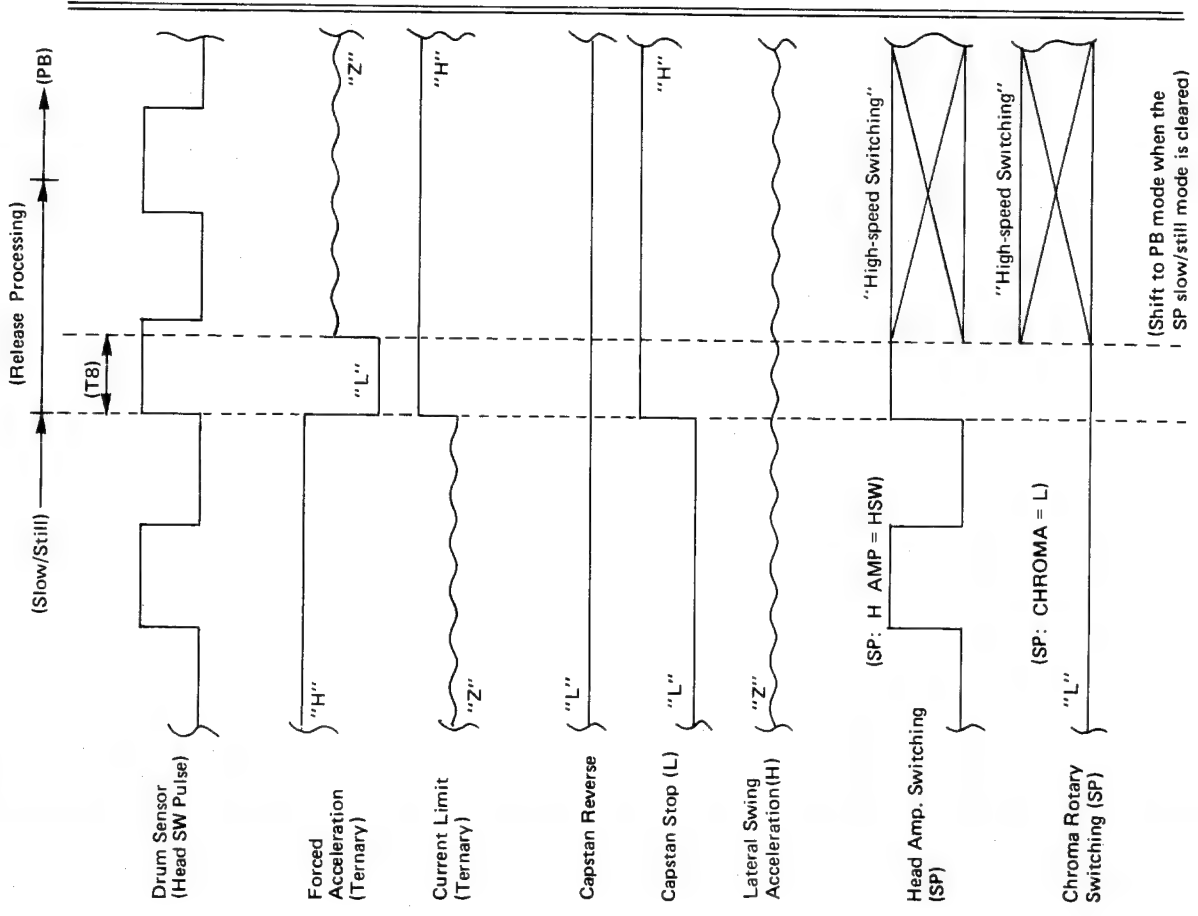


Figure 4-6:

Shift to PB mode when the LP Slow/Still mode is cleared
(4-head system)

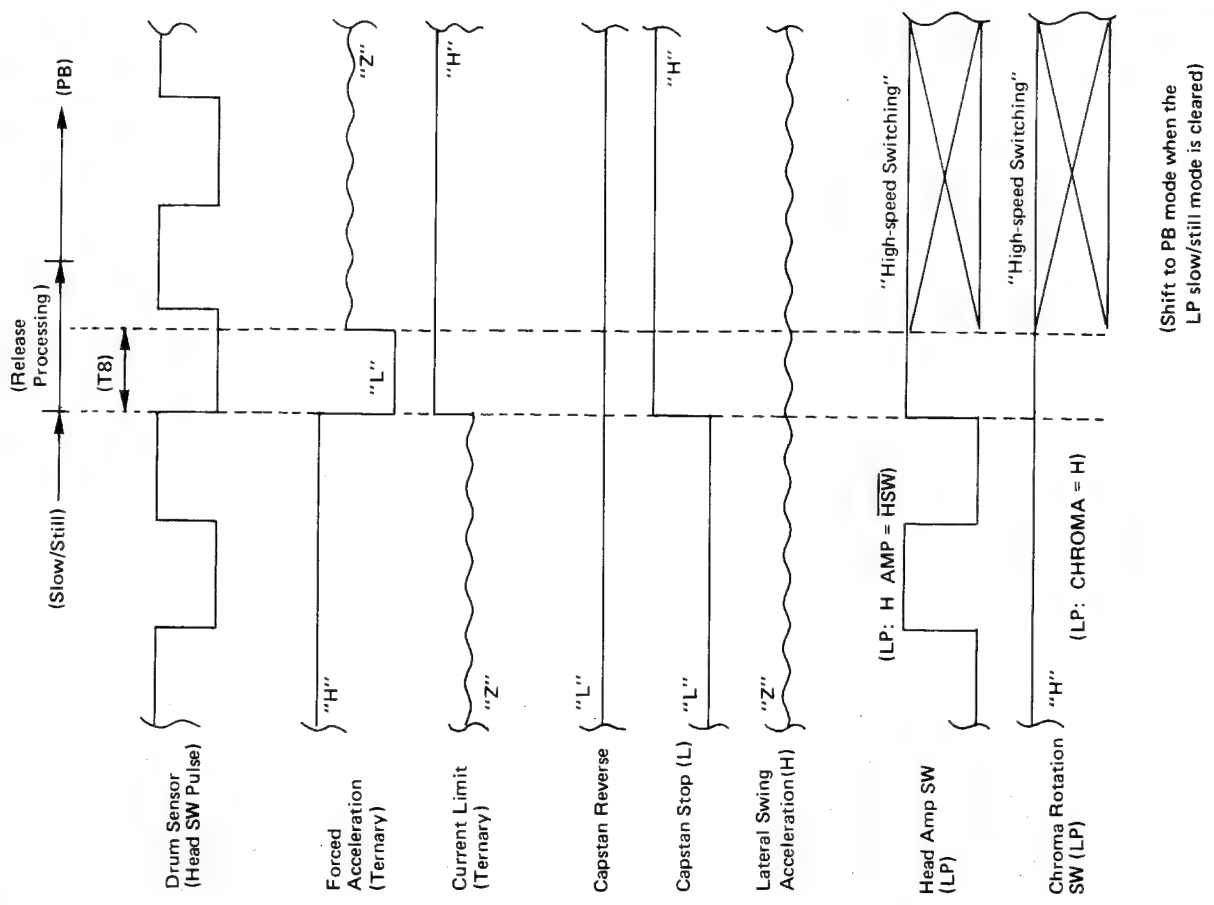


Figure 4-7.

Shift to REC/STOP mode when the SP Slow/Still mode is cleared
(4-head system)

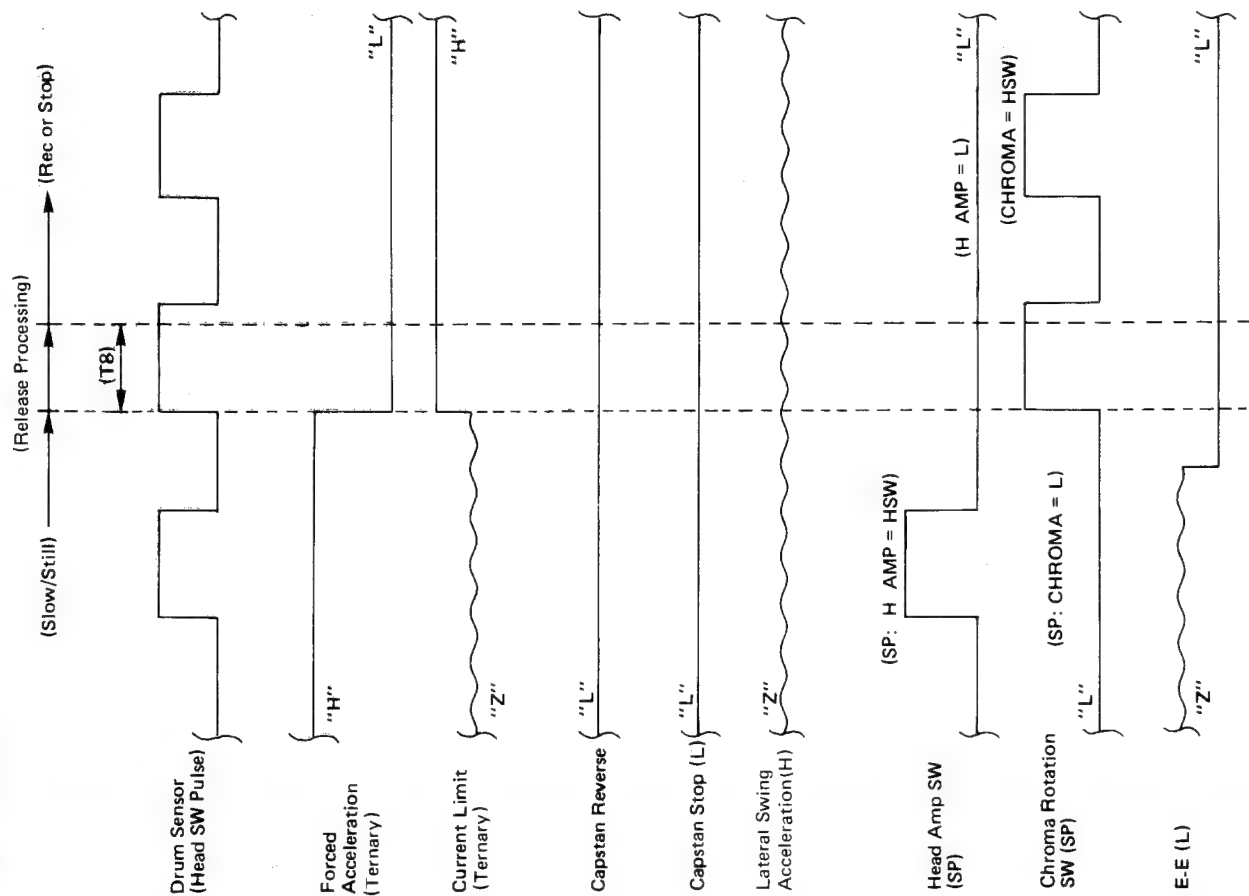


Figure 4-8. SP slow/still mode is cleared

Shift to REC/STOP mode when the SP Slow/Still mode is cleared
(4-head system)

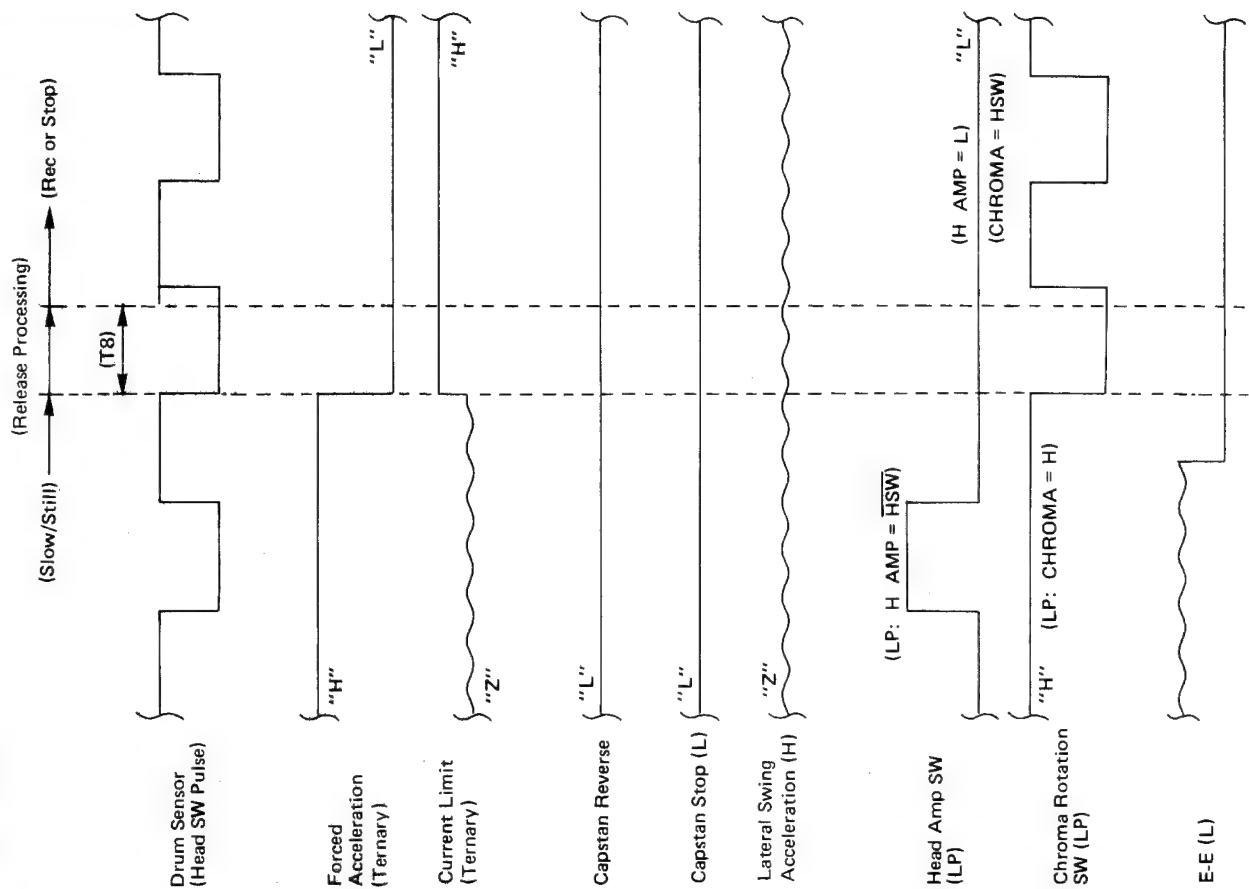


Figure 4-9. LP slow/still mode is cleared

Symbol		Item	Preset Value		
			SP	LP	
Frame Advancing	T0	Start M/M	14.08 ms	9.73 ms	
	T1	Forced acceleration M/M	18.94 ms	11.01 ms	
	T2	Lateral swing acceleration start time	23.04 ms	19.46 ms	
	T3	Lateral swing acceleration M/M	23.81 ms	33.28 ms	
	T4	Speed reduction M/M	11.78 ms	5.12 ms	
	T5	Brake M/M	12.29 ms	3.58 ms	
	T6	Speed reduction M/M (At Still On)	11.78 ms	7.94 ms	
	T7	Brake M/M (At Still On)	12.29 ms	3.58 ms	
Release	T8	Forced acceleration release	23.04 ms	9.22 ms	
	T9	—	—	—	

Note: Head 2 is special for SP; therefore, Slow/Still M/M, etc. of LP is under study.

Table 4-2.

5. TIMER CIRCUIT

5-1. The RH-IX0455GEZZ is a timer microcomputer LSI featuring the channel selection function by a voltage synthesizer tuner.
(VC-A111, A105, A505, T310, T510 Series)

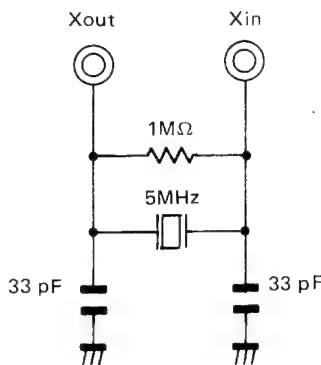
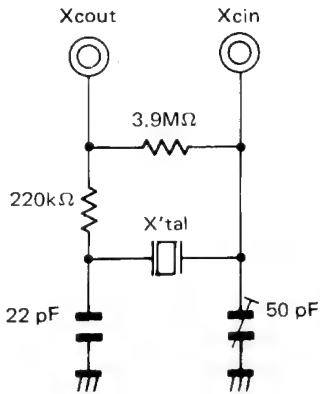
• Terminal Allocation (RH-IX0455GEZZ)

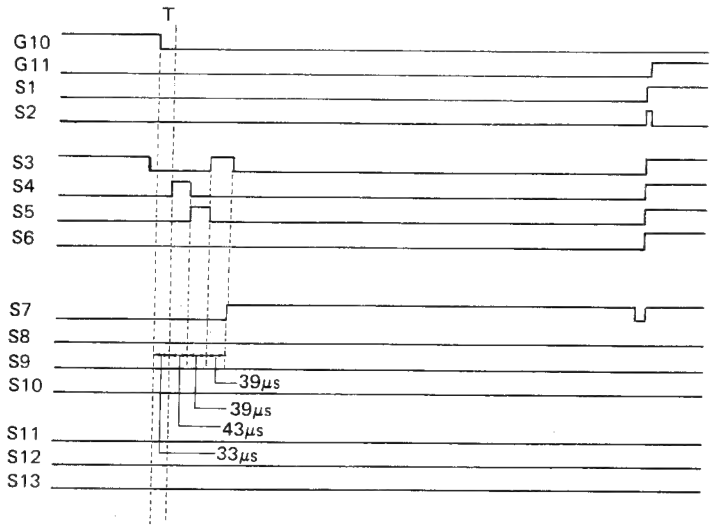
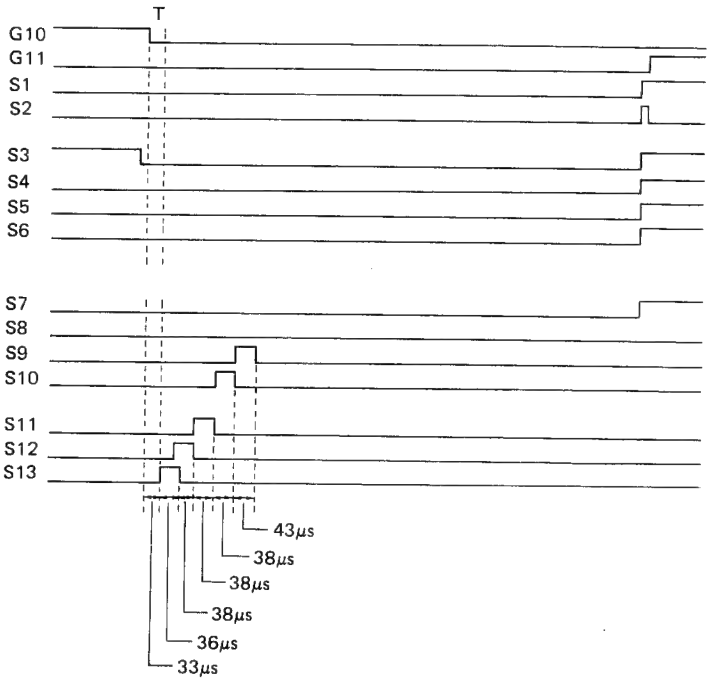
Terminal Name	No.	Name	Name	No.	Terminal Name
G11	64	P40	Vcc	1	+5V
G10	63	P41	P65	2	AUDIO-OUTPUT-CTL
G9	62	P42	P64	3	E ² PROM CS
G8	61	P43	P63	4	E ² PROM CLK
G7	60	P44	P62	5	E ² PROM S0/S1/OSD S0
G6	59	P45	P61	6	PWM OUTPUT
G5	58	P46	P60	7	AFT MUTE
G4	57	P47	P27	8	B0
G3	56	P00	P26	9	B1
G2	55	P01	P25	10	OSD MUTE/BLUE BACK
G1	54	P02	P24	11	OSD CLK
S13	53	P03	P23	12	OSD CS-(L)
S12	52	P04	P22	13	CTL FREQ. DIV. IC RESET
S11	51	P05	P21	14	SECAM OSD PROHIBIT INPUT
S10	50	P06	P20	15	NORMAL (L)
S9	49	P07	Srdy	16	SYS-READY-(L)
S4	48	P10	CLK	17	SERIAL-CLK-(L)
S5	47	P11	Sout	18	TIMER-SERIAL-DATA
S3	46	P12	Sin	19	SYS-CON-SERIAL-DATA
S7	45	P13	P33	20	CTL-PULSE (1/25)
S6	44	P14	P32	21	INTERNAL CLOCK CLK INPUT
S2	43	P15	P31	22	VIDEO TUNER
S1	42	P16	P30	23	AUDIO TUNER
S8	41	P17	INT1	24	A/C-PULSE
NC	40	P50	INT2	25	R/C-PULSE
PAY (H)	39	P51	CNV _{ss}	26	GND
-30V	38	Vp	RESET	27	RESET -(L)
KEY1	37	P54	Xin	28	CLOCK INPUT
KEY2	36	P55	Xout	29	CLOCK OUTPUT
KEY3	35	P56	XCin	30	CLOCK INPUT FOR TIMER
KEY4	34	P57	XCout	31	CLOCK OUTPUT FOR TIMER
X'TAL ADJ.	33	φ	V _{ss}	32	GND

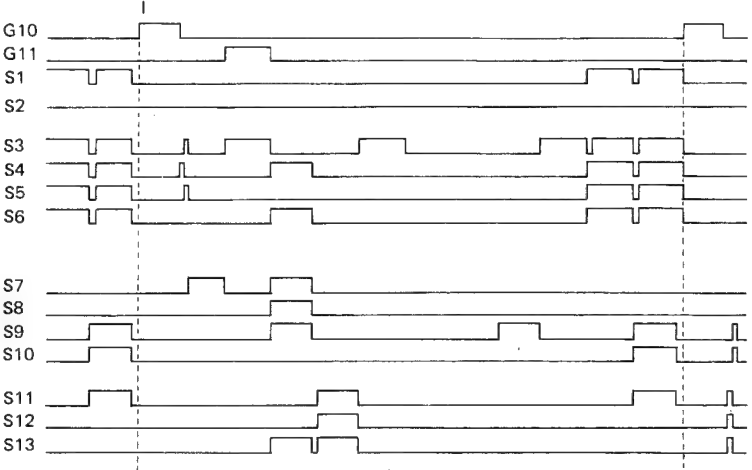
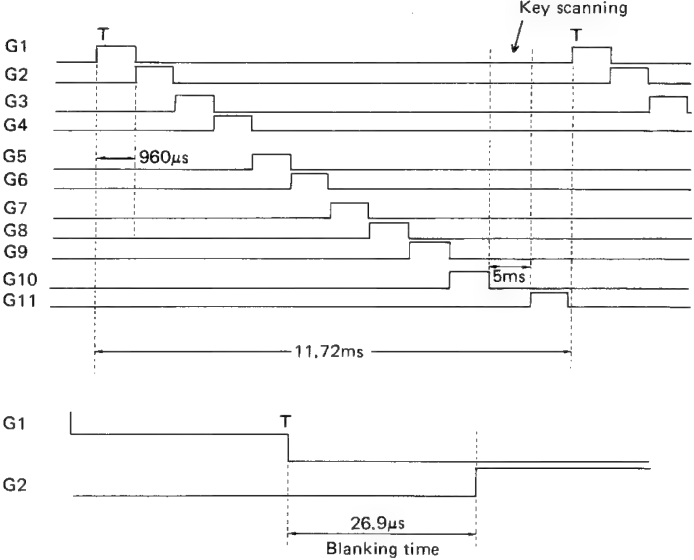
Figure 5-1.

5-2. TERMINAL DESCRIPTION (RH-iX0455GEZZ: Voltage synthesizer tuner)

Pin No.	Name	Description	I/O (Type)
1	Vcc	At 5V to be connected.	
2	AUDIO OUTPUT CTL	Control signal to switch the audio output between (L + R), L, R and NORMAL.	O (C-MOS)
3	E ² PROM CS	Used for serial transfer between Timer and EEPROM. Note that pin No. 5 (EEPROM SI/SO/OSD SV) is commonly used as the OSD Control serial port.	O (C-MOS)
4	E ² PROM CLK		O (C-MOS)
5	OSD SO/E ² PROM SI/SO		I/O (C-MOS)
6	PWM OUTPUT	Tuning voltage PWM output. 14-bit resolution.	O (C-MOS)
7	AFT-MUTE	Output when the volsyn is in preset mode or when tuning is being done.	O (C-MOS)
8	B0	Band switching output for tuning	O (N-CH)
9	B1		O (N-CH)
10	OSD MUTE/ BLUE BACK	OSD control serial terminal.	O (N-CH) O (N-CH)
11	OSD CLK		O (N-CH)
12	OSD CS-(L)		O (N-CH)
13	CTL FREQ. DIV. IC RESET	Control signal to reset the CTL frequency dividing IC.	O (N-CH)
14	SECAM OSD PROHIBIT INPUT	Control signal to prohibit the superimpose function while receiving SECAM signal.	I
15	NORMAL (L)	Terminal commonly used for forced normal (L) output and LR display mute (L) input. (A mute signal is supplied via the N-CH open drain circuit. On Hi-Fi models.)	O (N-CH)
16	SYS CON READY-(L)	Control signal for serial transfer between timer and system controller.	I
17	SYS CON/TIMER CLK		O (N-CH)
18	TIMER SERIAL DATA		O (N-CH)
19	SYS CON SERIAL DATA		I
20	CTL PULSE (1/25)	1-second count source input for the real time counter.	I
21	INTERNAL COUNTER CLK INPUT	Clock count input for the timer. Connected to Pin No. 31. Shortest pattern possible to be taken for connection.	I
22	VIDEO TUNER	Input switching control terminal.	O (N-CH)
23	AUDIO TUNER		O (N-CH)

Pin No.	Name	Description	I/O (Type)
24	A/C INPUT	A/C-shaped signal input for power failure detection. Power failure is identified if there is no change in A/C pulse for 35 msec. External interrupt at the rising edge.	I
25	R/C PULSE INPUT	Rising edge of T/C pulse is detected. External interrupt at the rising edge to measure the interval between two rising edges of R/C pulse.	I
26	CNVss	Connected to GND (0V).	
27	RESET-(L)	All Clear is made when a voltage lower than 0.6V has been put in for 2 μ sec or more after the supply voltage reached the microcomputer's operating voltage (5V + 10%).	I
28 29	Xin Xout	System clock generating circuit built-in. System clock is obtained by adding a ceramic resonance circuit as shown below. 	I O
30 31	Xc in Xc out	Timer count clock generating circuit built-in. Timer count clock is obtained by adding a crystal resonance circuit as shown below. 	I O
32	Vss	Connected to GND (0V).	

Pin No.	Name	Description	I/O (Type)
33	X'tal ADJ.	Crystal adjustment output. Adjustment is made when the microcomputer is reset. Half the crystal output (32.768 kHz) is given out with jumper provided.	O
34 35 36 37	KEY INPUT 4 KEY INPUT 3 KEY INPUT 2 KEY INPUT 1	<p>4 x 13 matrix is formed by Pin Nos. 41 thru 53 (S1 thru S2). Jumper input or key input is made.</p>  <p style="text-align: center;">Figure 5-4.</p>  <p style="text-align: center;">Figure 5-5.</p>	I I
38	Vp	- 30V to be connected	

Pin No.	Name	Description	I/O (Type)
39	PAY (H)	Output at "H" while the PAY position is selected.	O (P-CH)
40	NC		
41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64	S8 S1 S2 S6 S7 S3 S5 S4 S9 S10 S11 S12 S13 G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11	<p>Output terminals for fluorescent display tube drive segment signal and key scan strobe signal.</p> <p>(Segment signal) Segment signal output is timed with digit signal output at Pins 54 thru 64.</p>  <p style="text-align: center;">Figure 5-6.</p> <p>Output terminals for digit signals to drive the fluorescent display tube.</p>  $\text{Display duty} = \frac{960\mu\text{s}}{11.72\text{ms}} = \frac{1}{12.21}$ <p style="text-align: center;">Figure 5-7.</p>	<p>O (P-CH) High with-stand voltage</p> <p>O (P-CH) High with-stand voltage</p>

5-3. The RH-IX0454GEZZ is a timer microcomputer LSI featuring the channel selection function by a frequency synthesizer tuner.

(VC-A211, A605, T410 Series and VC-A212GM(BK), VC-A244GM(BK))

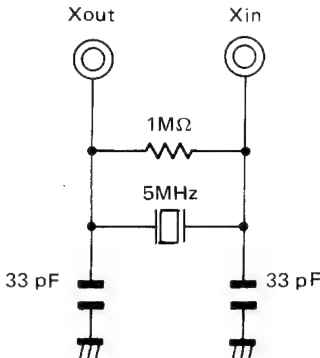
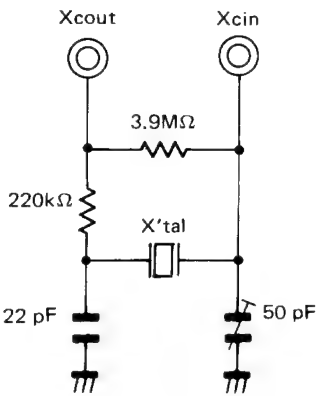
• Terminal Allocation (RH-IX0454GEZZ)

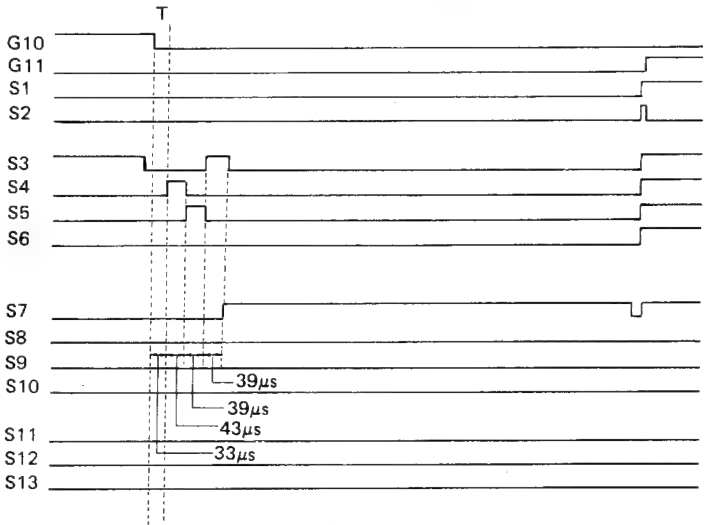
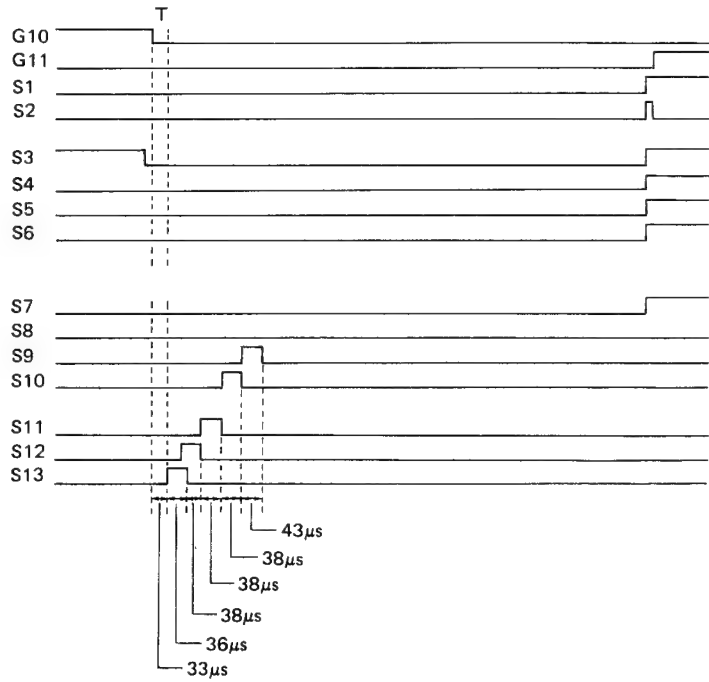
Terminal Name	No.	Name	Name	No.	Terminal Name
G11	64	P40	Vcc	1	+5V
G10	63	P41	P65	2	AUDIO-OUTPUT-CTL
G9	62	P42	P64	3	TUNER-READY-(L)
G8	61	P43	P63	4	TIMER/S _{syn} -CLK
G7	60	P44	P62	5	TIMER-SERIAL-DATA
G6	59	P45	P61	6	TUNER-SERIAL-DATA
G5	58	P46	P60	7	OSD CS-(L)
G4	57	P47	P27	8	OSD CLK
G3	56	P00	P26	9	OSD S0
G2	55	P01	P25	10	OSD MUTE/BLUE BACK
G1	54	P02	P24	11	OSD CLK
S13	53	P03	P23	12	OSD CS-(L)
S12	52	P04	P22	13	CTL FREQ. DIV. IC RESET
S11	51	P05	P21	14	SECAM OSD PROHIBIT INPUT
S10	50	P06	P20	15	NORMAL (L)
S9	49	P07	Srdy	16	SYS-CON-READY-(L)
S4	48	P10	CLK	17	SERIAL-CLK-(L)
S5	47	P11	Sout	18	TIMER-SERIAL-DATA
S3	46	P12	Sin	19	SYS-CON-SERIAL-DATA
S7	45	P13	P33	20	CTL-PULSE (1/25)
S6	44	P14	P32	21	INTERNAL CLOCK CLK INPUT
S2	43	P15	P31	22	VIDEO TUNER
S1	42	P16	P30	23	AUDIO TUNER
S8	41	P17	INT1	24	A/C-PULSE
NC	40	P50	INT2	25	R/C-PULSE
TUNER PCON	39	P51	CNV _{ss}	26	GND
-30V	38	Vp	RESET	27	RESET -(L)
KEY1	37	P54	Xin	28	CLOCK INPUT
KEY2	36	P55	Xout	29	CLOCK OUTPUT
KEY3	35	P56	XCin	30	CLOCK INPUT FOR TIMER
KEY4	34	P57	XCout	31	CLOCK OUTPUT FOR TIMER
X'TAL ADJ.	33	φ	V _{ss}	32	GND

Figure 5-8.

5-4. TERMINAL DESCRIPTION (RH-iX0454GEZZ: Frequency synthesizer tuner)

Pin No.	Name	Description	I/O (Type)
1	Vcc	At 5V to be connected.	
2	AUDIO OUTPUT CTL	Control signal to switch the audio output between (L + R), L, R and NORMAL.	O (C-MOS)
3	TUNER READY-L	Used for serial transfer between Timer and Fsyn. O (C-MOS)	I
4	TIMER Fsyn CLK		O (C-MOS)
5	TIMER-SERIAL DATA		O (C-MOS)
6	Fsyn-SERIAL-DATA		
7	OSD CS-(L)	OSD control serial terminal.	O (C-MOS)
8	OSD CLK		O (N-CH)
9	OSD S0		O (N-CH)
10	OSD MUTE/ BLUE BACK		O (N-CH)
11	SCL	I ² C BUS control terminal for the VPS decoder.	I/O (N-CH)
12	SDA		I/O (N-CH)
13	CTL FREQ. DIV. IC RESET	Control signal to reset the CTL frequency dividing IC.	O (N-CH)
14	SECAM OSD PROHIBIT INPUT	Control signal to prohibit the superimpose function while receiving SECAM signal.	I
15	NORMAL (L)	Terminal commonly used for forced normal (L) output and LR display mute (L) input. (A mute signal is supplied via the N-CH open drain circuit. On Hi-Fi models.)	O (N-CH)
16	SYSICON READY-(L)	Control signal for serial transfer between timer and system controller.	I
17	SYSICON/TIMER CLK		O (N-CH)
18	TIMER SERIAL DATA		O (N-CH)
19	SYSICON SERIAL DATA		I
20	CTL PULSE (1/25)	1-second count source input for the real time counter.	I
21	INTERNAL COUNTER CLK INPUT	Clock count input for the timer. Connected to Pin No. 31. Shortest pattern possible to be taken for connection.	I
22	VIDEO TUNER	Input switching control terminal.	O (N-CH)
23	AUDIO TUNER		O (N-CH)

Pin No.	Name	Description	I/O (Type)
24	A/C INPUT	A/C-shaped signal input for power failure detection. Power failure is identified if there is no change in A/C pulse for 35 msec. External interrupt at the rising edge.	I
25	R/C PULSE INPUT	Rising edge of T/C pulse is detected. External interrupt at the rising edge to measure the interval between two rising edges of R/C pulse.	I
26	CNVss	Connected to GND (0V).	
27	RESET-(L)	All Clear is made when a voltage lower than 0.6V has been put in for 2 μ sec or more after the supply voltage reached the microcomputer's operating voltage (5V + 10%).	I
28 29	Xin Xout	System clock generating circuit built-in. System clock is obtained by adding a ceramic resonance circuit as shown below. 	I O
30 31	Xc in Xc out	Timer count clock generating circuit built-in. Timer count clock is obtained by adding a crystal resonance circuit as shown below. 	I O
32	Vss	Connected to GND (0V).	

Pin No.	Name	Description	I/O (Type)
33	X'tal ADJ.	Crystal adjustment output. Adjustment is made when the microcomputer is reset. Half the crystal output (32.768 kHz) is given out with jumper provided.	O
34 35 36 37	KEY INPUT 4 KEY INPUT 3 KEY INPUT 2 KEY INPUT 1	<p>4 x 13 matrix is formed by Pin Nos. 41 thru 53 (S1 thru S2). Jumper input or key input is made.</p>  <p style="text-align: center;">Figure 5-11.</p>  <p style="text-align: center;">Figure 5-12.</p>	I I
38	Vp	- 30V to be connected	

Pin No.	Name	Description	I/O (Type)
39	TUNER PCON	Control signal to supply the power to the tuner circuit is standby mode.	High with stand voltage
40	NC		
41	S8	Output terminals for fluorescent display tube drive segment signal and key scan strobe signal. (Segment signal) Segment signal output is timed with digit signal output at Pins 54 thru 64.	O (P-CH) High with-stand voltage
42	S1		
43	S2		
44	S6		
45	S7		
46	S3		
47	S5		
48	S4		
49	S9		
50	S10		
51	S11		
52	S12		
53	S13		
54	G1		
55	G2		
56	G3		
57	G4		
58	G5		
59	G6		
60	G7		
61	G8		
62	G9		
63	G10		
64	G11		

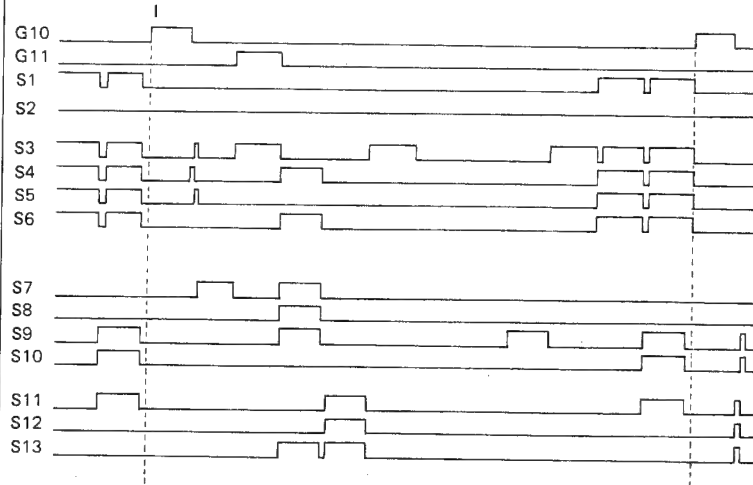
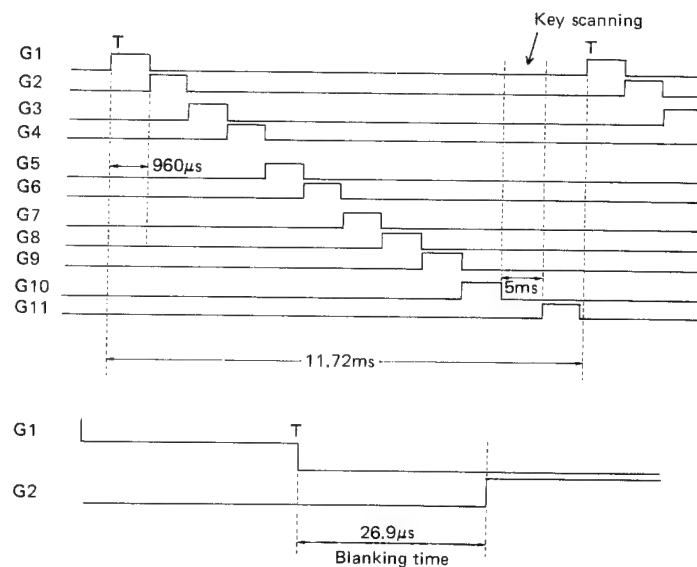


Figure 5-13.

Output terminals for digit signals to drive the fluorescent display tube.



$$\text{Display duty} = \frac{960\mu\text{s}}{11.72\text{ms}} = \frac{1}{12.21}$$

Figure 5-14.

VC-A111,A105,A114,A211
A244,T212,T310,T410,
VC-A505,A605,T510 Series

SHARP

SHARP**SERVICE MANUAL**

S88F3VC-T310H

**VHS VIDEO CASSETTE RECORDER****MODEL VC-T310H**

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

CONTENTS

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• SPECIFICATIONS	2
• DISASSEMBLY AND REASSEMBLY	3
• LOCATION OF MECHANICAL PARTS	4
• ADJUSTMENT, REPLACEMENT, ASSEMBLING AND TOOLS NECESSARY FOR MECHANICAL ADJUSTMENT	6
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• OVERALL SCHEMATIC DIAGRAM	39
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• WIRING SIDE PWBs	55
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SHARP CORPORATION

SPECIFICATIONS

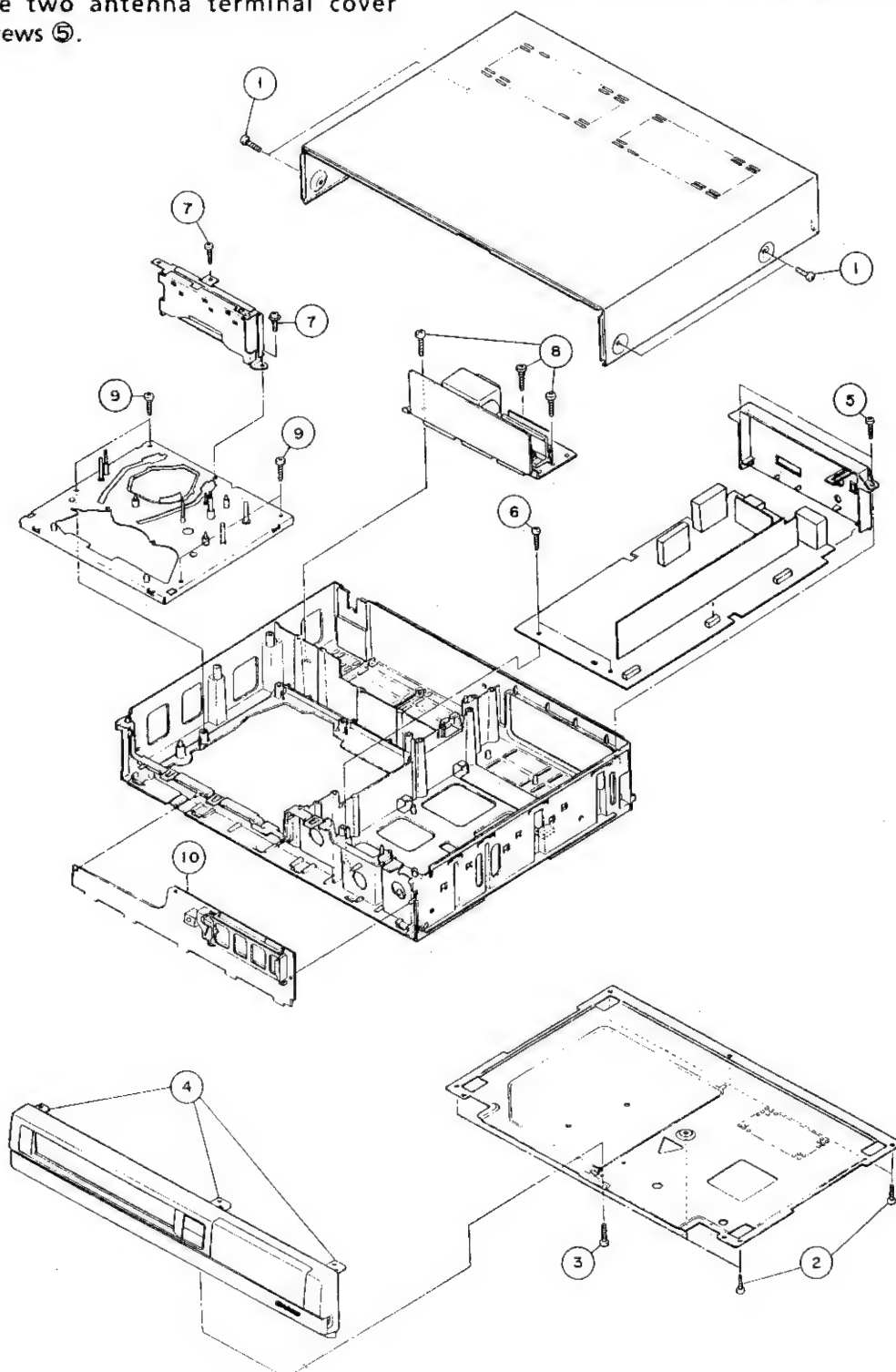
Format:	VHS PAL standard
Video recording system:	Two rotary head helical scan system
Video signal:	PAL colour and B/W signals, 625 lines
Recording playing time:	4 hours max. with SHARP E - 240 tape
Tape width:	12.7 mm
Tape speed:	23.39 mm/sec.
Antenna:	75 ohm unbalanced
Receiving channel:	UHF Channel 21 - 69
RF converter output signal:	UHF Channel 30 - 39 (Adjustable). Preset to 36 Channel
Power requirement:	AC 240V, 50 Hz
Power consumption:	Approx. 24W
Operating temperature:	5°C to 40°C
Storage temperature:	- 20°C to 55°C
Weight:	6.0kg
Dimensions:	430 mm (W) × 347 mm (D) × 82 mm (H)
VIDEO	
Input:	1.0 Vp-p, 75 ohm
Output:	1.0 Vp-p, 75 ohm
AUDIO	0 dB = 0.775 Vrms
Input:	Line: - 3.8 dB, more than 50k ohm
Output:	Line: - 3.8 dB, less than 1k ohm
Accessories included:	Antenna 75 ohm coaxial connector cable (plug provided) Operation Manual Infrared remote control

As part of our policy of continuous improvement, we reserve the right to alter design and specifications without notice.
--

Note: The antenna must correspond to the new standard DIN 45325 (IEC 169 - 2) for combined UHF/VHF antenna with 75 ohm connector.

DISASSEMBLY AND REASSEMBLY

1. Remove the four upper cabinet fastening screws ①.
2. Remove the six bottom panel fastening screws ②.
3. Remove the one front panel fastening screw ③.
4. Release the three clips ④ and remove the front panel.
5. Remove the two antenna terminal cover fastening screws ⑤.
6. Remove the two main PWB fastening screws ⑥.
7. Remove the two head amp PWB fastening screws ⑦.
8. Remove the three power unit fastening screws ⑧.
9. Remove the four mechanism chassis fastening screws ⑨.
10. Release the timer PWB ⑩ fastening clips.

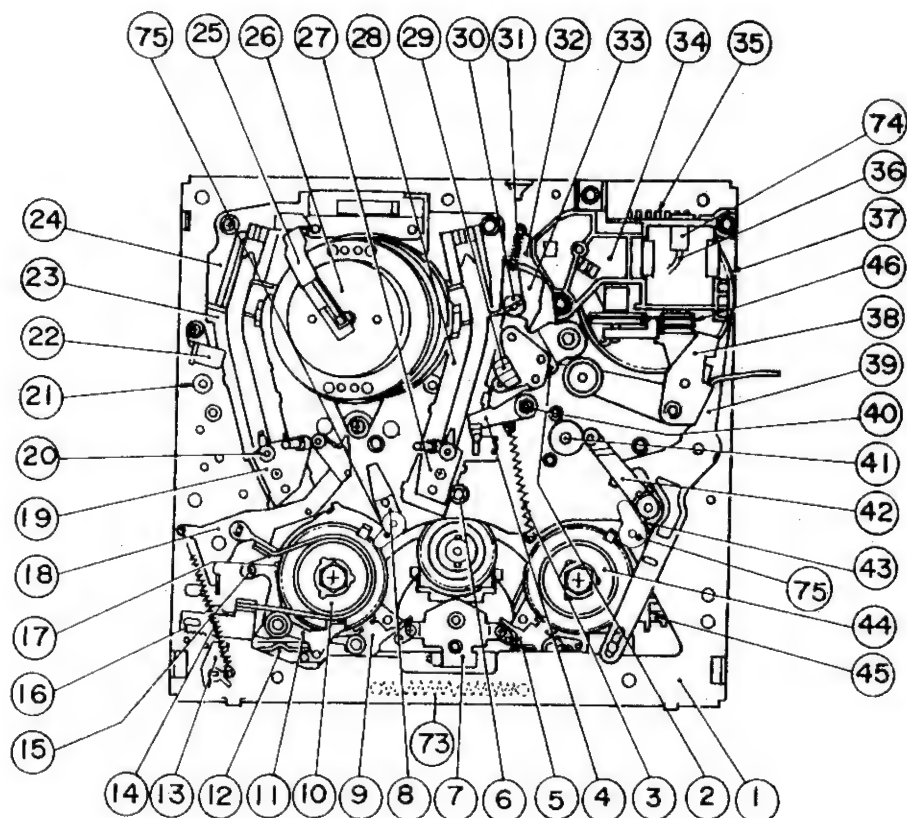


LOCATION LIST OF MECHANICAL PARTS

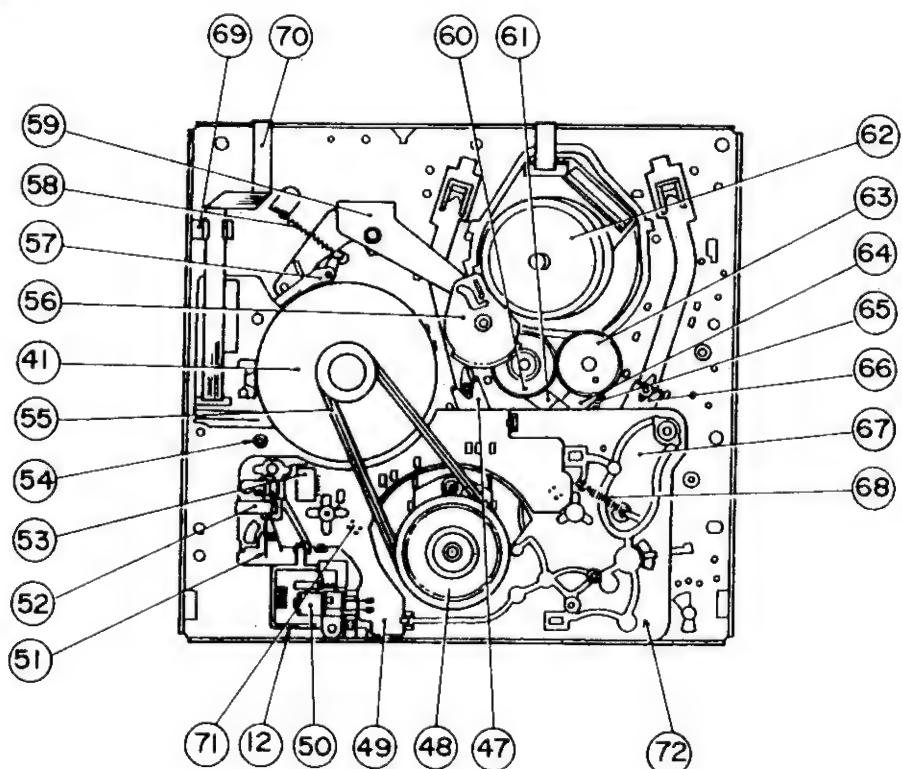
No.	Part Name	No.	Part Name
1	Main chassis ass'y	38	Pinch roller lever ass'y
2	A/C head arm	39	Relay shifter lever
3	Half-loading lever spring	40	Retaining guide
4	Half-loading lever	41	Capstan D.D. motor
5	Main take-up brake lever	42	Reverse guide
6	Cassette LED	43	Reverse guide spring
7	Idler gear ass'y	44	Take-up reel disk
8	Cassette control earth spring	45	Video search brake lever
9	Main supply brake lever	46	Loading belt
10	Supply reel disk	47	Take-up pole base slider
11	Back tension lever	48	Reel pulley
12	Brake shifter	49	Reel sensor PWB
13	Tension spring hook plate	50	Brake solenoid
14	Tension spring	51	Shifter spring
15	Tension release lever	52	Shifter spring cover
16	Tension band ass'y	53	Connector
17	Auxiliary fast forward brake lever	54	Reverse guide spring
18	Tension arm ass'y	55	Reel belt
19	Supply pole base ass'y	56	Loading relay gear
20	Guide roller ass'y	57	Slow brake lever
21	Supply impedance roller	58	Slow brake spring
22	Full erase head ass'y	59	Relay gear drive lever
23	Supply loading rail	60	Take-up loading gear
24	Drum base	61	Take-up loading arm ass'y
25	Earth brush ass'y	62	Drum D.D. motor ass'y
26	Drum ass'y	63	Supply loading gear
27	Take-up pole base ass'y	64	Supply loading arm ass'y
28	Take-up loading rail	65	Loading reciprocating spring
29	A/C head ass'y	66	Supply pole base slider
30	X-position adjusting nut	67	Reel block chassis
31	Half-loading reciprocating spring	68	Auxiliary fast forward brake spring
32	Half-loading reciprocating lever	69	Full flat cable holder
33	Half-loading drive lever	70	Full flat cable(Drum D.D. motor)
34	Loading block ass'y	71	Reel sensor
35	Cam switch	72	Reel block
36	Loading motor	73	Main brake spring
37	Master cam	74	Dew sensor
		75	Take-up reel disk catch holder

LOCATION OF MECHANICAL PARTS

• TOP VIEW



• BOTTOM VIEW












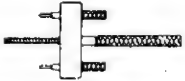
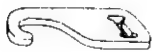
ADJUSTMENT, REPLACEMENT, ASSEMBLY AND CLEANING OF MECHANICAL UNITS







Here we will describe a relatively simple service work in the field, not referring to the more complicated repairs which would require the use of special equipment and tools (drum assembly or replacement, for example).

We are sure that the easy-to-handle tools listed below would be more than handy for periodical maintenance to keep the machine in its original efficient condition.

TOOLS NECESSARY FOR ADJUSTING THE MECHANICAL UNITS

The following tools are required for proper service and satisfactory repair.

No.	Jig Item	Part No.	Code	Configuration	Remarks
1	Reel Disk Height Adjusting Jig	JiGRH0002	BR		These Jigs are used for checking and adjusting the reel disk height.
2	Master Plane Jig	JiGMP0001	BY		
3	A/C Head Tilt Adjusting Jig	JiGACH-F18	BU		This Jig is used for setting the A/C head tilt.
4	Torque Gauge (90g)	JiGTG0090	CM		These Jigs are used for checking and adjusting the torque of take-up and supply reel disks.
	Torque Gauge (1.2 kg)	JiGTG1200	CN		
5	Gauge Head	JiGTH0006	AW		
6	Cassette Torque Meter	JiGVHT-063	CZ		This cassette torque meter is used for checking and adjusting the torque of take-up and supply reel and for measuring tape back tension.
7	Tension Gauge (300g)	JiGSG0300	BF		There are two Gauges used for the tension measurements, 300 g and 2.0 kg.
	Tension Gauge (2.0 kg)	JiGSG2000	BS		
8	Hex Wrench (0.9 mm)	JiGHW0009	AE		These Jigs are used for loosening or tightening special Hexagon type screws.
	Hex Wrench (1.2 mm)	JiGHW0012	AE		
	Hex Wrench (1.5 mm)	JiGHW0015	AE		
9	Alignment Tape (PAL)	VROCPSV	CK		This tape is especially used for electrical fine adjustment.
10	Drum Replacing Jig	JiGDT-0001	BG		This is used for replacement of the VCR's upper drum.
11	Tension Gauge Adapter	JiGADP003	BK		This Jig is used for the tension gauge. Rotary Transformer Clearance Adjusting Jig.

No.	Jig Item	Part No.	Code	Configuration	Remarks
12	Special Bladed Screwdriver	JiGDRiVERH-4	AP		This Screwdriver is used for adjusting the guide roller height and X-position.
13	Tension Band and Plate Adjusting Jig	JiGDRIVER-6	BM		This Jig is used for adjusting the tension band and tension plate.
14	Torque Driver	JiGTD1200	CB		This is used to screw down resin-made parts: the specified torque is 5 kg.
15	Box Driver	JiGDRIVER110-7	AS		This Jig is used for height adjustment of the A/C head.
		JiGDRIVER110-4	AV		This Jig is used for height adjustment of the retaining guide.
16	Retaining Guide Height Adjusting Jig	JiGGH-F18	BU		This Jig is used for height adjustment of the retaining guide.
17	Reverse Guide Height Adjusting Jig	JiGRVGH-F18	BU		This Jig is used for height adjustment of the reverse guide.

NOTE:

Current JiGMA0001 contains Master Plane (JiGMP0001) and Disk Height Adjusting Jig (JiGRH0001). Even though new Disk Height Adjusting Jig (JiGRH0002) covers greater height, this new Jig (JiGRH0002) can be used for current JiGRH0001, but current Jig (JiGRH0001) cannot be used as JiGRH0002. Master Plane (JiGMP0001) can be used with JiGRH0001 and JiGRH0002 as well.

MECHANICAL PARTS REQUIRING PERIODICAL INSPECTION

Use the following table as a guide to maintain the mechanical parts in good operating condition.

Parts	Maintained every	500 hrs.	1000 hrs.	1500 hrs.	2000 hrs.	3000 hrs.	Remarks
Guide roller ass'y		□	□	□	□	□	Abnormal rotation or significant vibration requires replacement.
Supply impedance roller		□	□	□	□	□	
Supply impedance roller (inner)			□		□	□	Clean with pure high quality isopropyl alcohol.
Supply impedance roller flange		□	□	□	□	□	Clean tape contact area with the specified cleaning liquid.
Retaining guide		□	□	□	□	□	
Slant pole		□	□	□	□	□	
Video head		□	○□	□	○□	○□	Clean tape contact area with the specified cleaning liquid.
Full-erase head		□	□	□	□	□	
A/C head		□	□	□	□	□	
Pinch roller		□	□	□	□	○□	Clean rubber and rubber contact area with the specified cleaning liquid.
Reel belt			□		□		
Loading belt			□		○		
Capstan loading belt			□		○		
Reel block*					○		
Tension band ass'y						○	
*See the table below for servicing the reel block parts.							
Supply/take-up reel disks			□ △		□△○		Clean with pure high quality isopropyl alcohol.
Video serch brake lever					○		
Idler gear ass'y					○		
Reel idler			□△		□△		
Main supply/take-up brake levers					○		

NOTE: ○: Part replacement.
 □: Cleaning (For cleaning, use a lint-free cloth dampened with pure isopropyl alcohol).
 △: Oil refilling (The indicated point should be lubricated with high quality spindle oil every 1000 hrs).

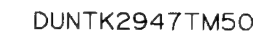
This model has no adjusting parts for torques, tension, etc. If the reading is outside the specified range, clean or replace the part.

A
B
C
D
E
F
G
H



Playback Luminance Signal

Playback Chrominance Signal



ATTENTION

DICED RH-0X00486Z2
or RH-0X005376Z2
RH-0X00486U22
(ALTERNATE PART)

ADJUSTMENT OF ELECTRICAL CIRCUITRY

Prior to the adjustment:

In most cases, necessity for electrical circuits will arise from replacement of mechanical parts including the video head. Before starting adjustment of electrical circuits, check that mechanical operation of the equipment is complete (the mechanism are adjusted completely).

If the equipment fails electrically, locate a defect or defects first of all using instruments. Then repair or replace parts and make adjustment by the procedures described below.

When required instruments are not available, do not move controls indiscriminately.

• Instruments

- Colour monitor TV
- DC regulated power supply
- VTVM
- Oscilloscope
- Audio generator
- Colour bar generator
- Alignment tape
- Frequency counter
- Blank video tape(VHS)

ADJUSTMENT OF MAIN (SERVO, SYSTEM CONTROL, TUNER) CIRCUIT

• Test points layout

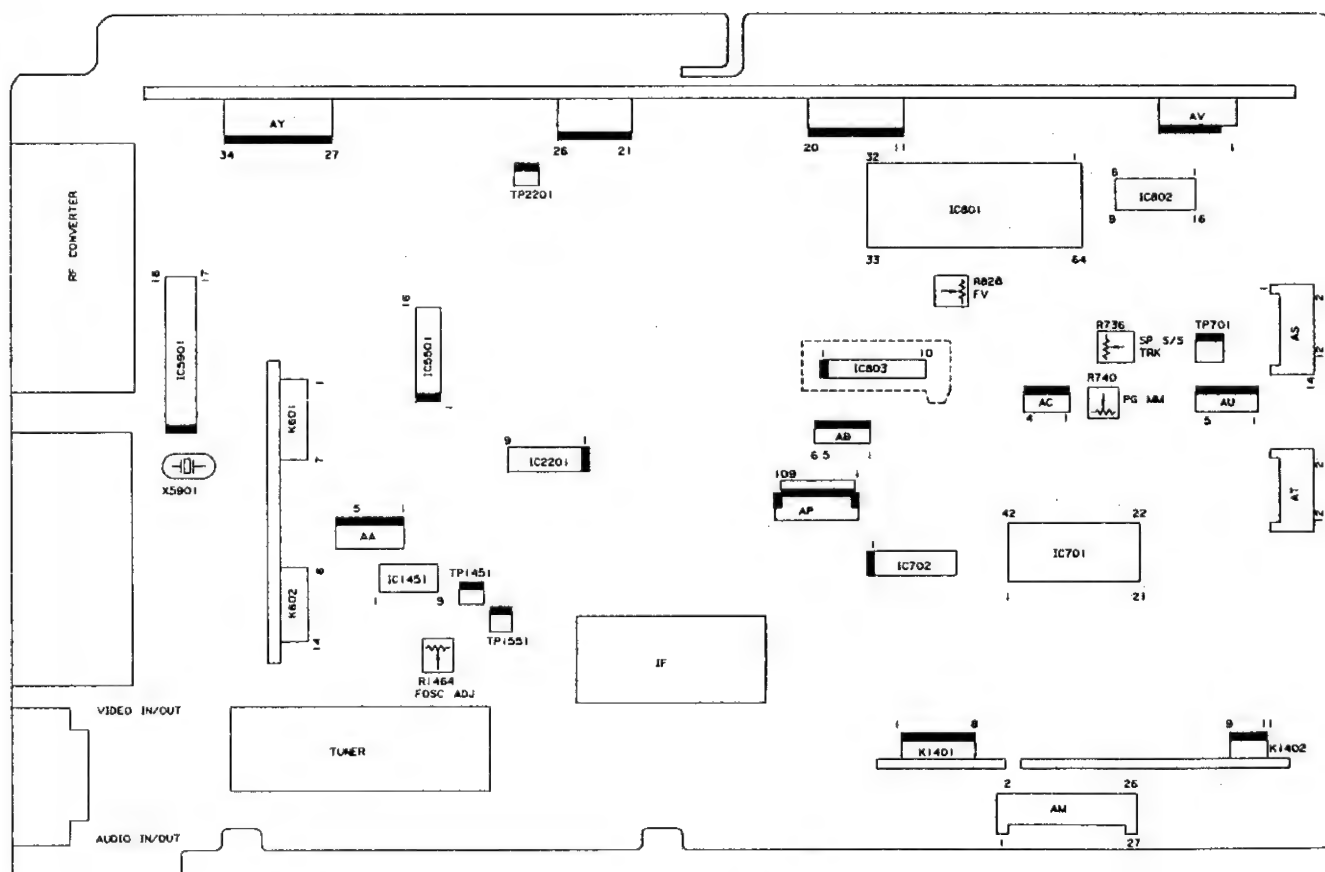


Figure 2-1. MAIN PWB

ADJUSTMENT OF SERVO CIRCUIT

Adjustment of playback switching point

Measuring instrument	Oscilloscope
Mode	Playback Tracking button at center
Tape used	Alignment tape (VROCPV)
Test point	CH-1; TP701 CH-2; Video output terminal (CH-1 trigger slope switch at (+), Internal trigger at CH-1 side)
Adjusting point	R740(phase generator MM control)
Specification	$6.5 \pm 0.5H$

1. Insert the alignment tape (VROCPV) and put the unit in the playback mode.
2. Set the tracking button to the center position.
3. Adjust R740 (phase generator MM control) so that the waveform on the oscilloscope screen be as shown in Fig. 2-2.

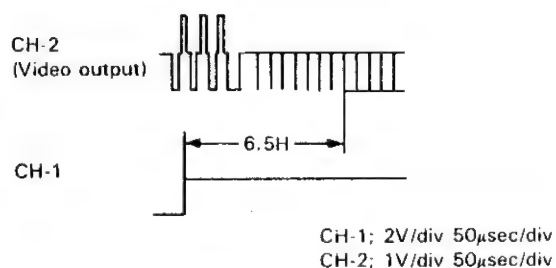


Figure 2-2.

Adjustment of SP slow tracking

Measuring instrument	Monitor TV
Mode	Record time switch at SP Position. Recording and playback on self-recording tape.
Input signal	Commercial broadcast or video signal (external input selector switch)
Test Point	Monitor screen
Adjusting point	R736 (SP slow tracking control)
Specification	No noise bar on the monitor TV screen

1. Receive a commercial broadcast signal, or feed the video signal to the video input terminal (with the external input selector switch).
2. Set the record time switch to the SP position. Make recording and playback on the self-recording tape.
3. Press the slow button and play back the recorded portion in the slow mode.
4. Set the tracking button to the center position.
5. Observing the monitor screen, adjust the SP slow tracking preset control (R736) until the noise bar disappears from the screen.
6. Press the playback button to play back the tape. Then push the pause/still button to reproduce the recording in the still mode. Now make sure there is no noise on the screen. (Repeat this step three times or so.)

Adjustment of still picture vertical sync

Measuring instrument	Monitor TV
Mode	Still picture playback
Tape used	Self-recording tape
Test point	Monitor screen
Adjusting point	R828 (still picture vertical sync control)
Specification	No vertical jitter

1. Play back the tape self-recorded in the SP mode.
2. Press the pause/still button to reproduce the recording in the still mode.
3. Observing the monitor screen, adjust the still picture vertical sync control (R828) until the vertical jitter disappears from the screen.

■ ADJUSTMENT OF Y/C RECORDING CIRCUIT

Adjustment of EE level

Measuring instrument	Oscilloscope
Mode	SP recording
Input signal	Standard colour bar (stair-case waveform)
Test point	Video output terminal
Adjusting point	R201 (EE level control)
Specification	$1.0 \pm 0.05 \text{ Vp-p}$

Note:

The video output terminal should be terminated with a 75-ohm impedance.

1. Set the unit to the SP record mode.
2. Feed the colour bar signal (stair-case waveform) to the video input terminal. Observing the voltage across the terminal resistor of the video output terminal on the oscilloscope screen, adjust R201 (EE level control) to obtain the value indicated in Fig. 2-6.

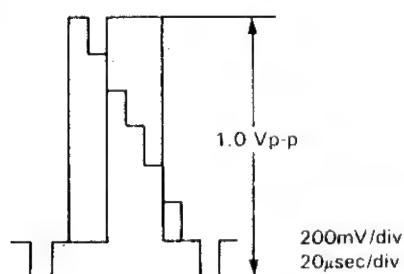


Figure 2-6.

Adjustment of FM 3.8 MHz and 4.8 MHz

Measuring instrument	Frequency counter	Oscilloscope
Mode	Recording	Self-recording / playback
Input signal	External input (no signal)	Standard colour bar (stair-case waveform)
Test point	Pin 28 of IC201	Video output terminal
Adjusting point	R222 (FM carrier control)	R220 (deviation control)
Specification	3.8 MHz	$1.0 \pm 0.05 \text{ Vp-p}$

Note. 1:

Carry out this adjustment only when IC201 has been replaced or when the carrier setting (3.8 MHz) or the deviation (4.8 MHz) is found apparently out of specification.

Make this adjustment after the EE level has been completely adjusted.

Note. 2:

The video output terminal should be terminated with a 75-ohm impedance.

1. First make sure that the EE level playback video signal is at the specified level.
2. Place the unit in the record mode and get it ready for external input.

Note:

Do not connect anything to the external input terminal.

3. Hook up the frequency counter to pin 28 of IC201. Adjust R222 (FM carrier control) so that the counter reading be 3.8 MHz.

Note:

Make sure the white and dark clip controls are not now applied to the waveform.

4. Feed the colour bar signal (stair-case waveform) and make self-recording and playback.
5. Observe the video output terminal voltage (across the terminal resistor) on the oscilloscope screen. If the playback video signal level is below 1.0 Vp-p, turn R220 (deviation control) clockwise. If above 1.0 Vp-p, turn the control counterclockwise. Now make self-recording and playback again.
6. Repeat the above step 5 to finally get the playback video signal level at $1.0 \pm 0.05 \text{ Vp-p}$, as shown in Fig. 2-5.

Adjustment of white clip

Measuring instrument	Oscilloscope
Mode	Recording
Input signal	Standard colour bar (stair-case waveform)
Test point	TP201
Adjusting point	R225 (white clip control)
Specification	$80 + 0 - 4 \%$

1. Place the unit to the record mode.
2. Feed the colour bar (stair-case waveform) signal.
3. Observing the output at TP201, adjust R225 (white clip control) so that the white peak overshoot be $80 + 0 - 4 \%$.

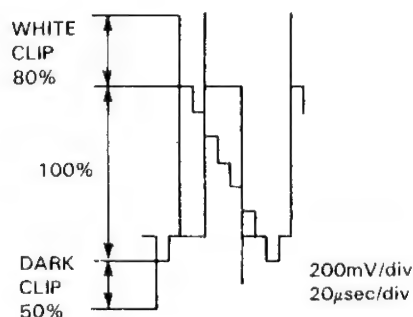


Figure 2-7.

Adjustment of dark clip

Measuring instrument	Oscilloscope
Mode	Recording
Input signal	Standard colour bar (stair-case waveform)
Test point	TP201
Adjusting point	R224 (dark clip control)
Specification	$50 \pm 4\%$

1. Place the unit to the recording mode.
2. Feed the colour bar (stair-case waveform) signal.
3. Observing the output at TP201, adjust R224 (dark clip control) so that the dark peak overshoot be $50 \pm 4\%$. (See fig. 2-7.)

Adjustment of recording current

Measuring instrument	Oscilloscope	
Mode	Recording	
Input signal	Standard colour bar (stair-case waveform)	
Test point	TP301 (GND at TP302) External trigger (video output terminal)	
Adjusting point	R3304 (recording FM control)	R518 (recording chroma control)
Specification	Sync tip level $140 \pm 10\text{mVp-p}$	Red level $24 \pm 1\text{mVp-p}$

Note:

TP301 and TP302 are located on the head amp PWB.

1. Place the unit to the record mode.
2. Feed the colour bar (stair-case waveform) signal.
3. Observing the waveform on the oscilloscope screen (external trigger at video output terminal), take the following steps.
 - a) Connect the oscilloscope's GND and SIG leads to TP302 and TP301, respectively.
 - b) Turn R3304 (recording FM control) to minimum.
 - c) Adjust R518 (recording chroma control) to that the red level be $24 \pm 1\text{mVp-p}$ as shown in Fig.2-8.
4. Adjust R3304 (recording FM control) so that the sync tip be $140 \pm 10\text{mVp-p}$ as shown in Fig. 2-9.

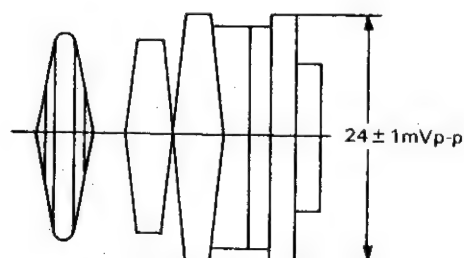


Figure 2-8.

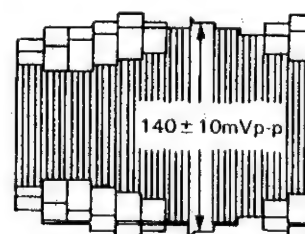


Figure 2-9.

■ ADJUSTMENT OF Y/C PLAYBACK CIRCUIT

Adjustment of playback video signal level

Measuring instrument	Oscilloscope
Mode	Playback
Tape used	Alignment tape (stair-case waveform)
Test point	TP201
Adjusting point	R414 (playback level control)
Specification	$1.0 \pm 0.05\text{Vp-p}$

Note:

The video output terminal should be terminated with a 75-ohm impedance.

1. Insert the alignment tape (stair-case waveform) and place the unit to the playback mode.
2. Hook up the oscilloscope to the video output terminal. Adjust R414 (playback level control) so that the on-screen waveform be $1.0 \pm 0.05\text{Vp-p}$.

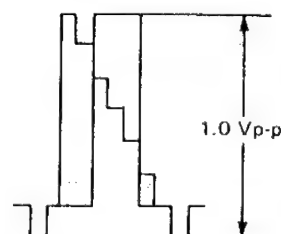


Figure 2-10.

Adjustment of APC

Measuring instrument	Frequency counter
Mode	Playback
Tape used	Alignment tape (VROCPSV)
Test point	Pin ⑦ of CA connector
Adjusting point	R506
Specification	4.433619MHz \pm 50Hz

1. Insert the alignment tape (VROCPSV) and place the unit to the playback mode.
2. Connect the frequency counter to pin ⑦ of CA connector. Adjust R506 (APC control) so that the counter reading be 4.433619MHz \pm 50Hz.

ADJUSTMENT OF AUDIO CIRCUIT

• Test point layout

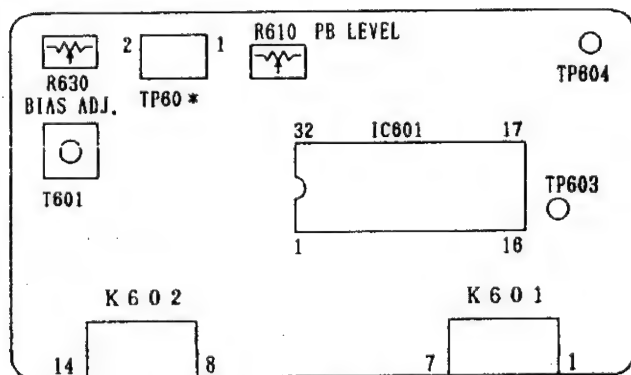


Figure 2-11. AUDIO PWB

Adjustment of playback level

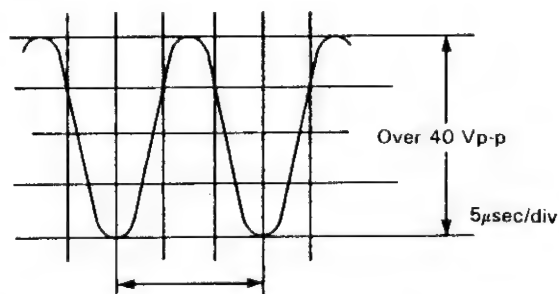
Measuring instrument	VTVM
Mode	Playback
Input signal	Alignment tape (VROCPSV) (1-kHz level control signal)
Test point	Audio output terminal
Adjusting point	R610 (playback level control)
Specification	-8 \pm 0.5dBm

1. Play back the alignment tape (1-kHz level control signal).
2. Hook up the VTVM to the audio output terminal.
3. Adjust R610 (playback level control) so that the output level be -8 \pm 0.5dBm.

Checking of erase voltage and oscillation frequency

Measuring instrument	Oscilloscope
Mode	Recording
Input signal	—————
Test point	Both ends of the full-erase head
Adjusting point	—————
Specification	Erase voltage; Over 40 Vp-p Oscillation frequency; 70 \pm 7kHz

1. Place the unit to the record mode.
2. Hook up the oscilloscope to both ends of the full-erase head.
3. Make sure the erase voltage is over 40 Vp-p.
4. Be sure that the oscillation frequency is 70 \pm 7kHz.



63 kHz to 77 kHz about three divisions

Figure 2-12.

Adjustment of bias current

Measuring instrument	VTVM
Mode	Recording
Input signal	—————
Test point	TP601 (SIG), TP602 (GND)
Adjusting point	R630 (bias current control)
Specification	260 \pm 10 μ A

1. Place the unit to the record mode.
2. Connect the VTVM to TP601 (SIG) and TP602 (GND).
3. Adjust R630 (bias current control) so that the bias current be 260 \pm 10 μ A (2.6 \pm 0.1mV).

Checking of recording level

Measuring instrument	VTVM
Mode	Self-recording/playback
Input signal	1 kHz/ - 3.8dBm
Test point	Audio output terminal
Adjusting point	_____
Specification	- 3.8 ± 3dBm

1. Feed 1 kHz, - 3.8 dBm signal to the audio input terminal. Make self-recording and playback of the signal.
2. Make sure the output at the audio output terminal is $- 5 \pm 3$ dBm.
3. If out of spec, readjust the playback level and the bias current.

ADJUSTMENT OF IF CIRCUIT

Adjustment of RF AGC

Measuring instrument	Oscilloscope Signal generator
Mode	_____
Input signal	Colour bar signal
Test point	Video output terminal
Adjusting point	VR001 (on IF pack)

1. Receive the colour bar signal (input field strength: 80 dB μ).
2. Observe the video output terminal waveform on the oscilloscope. Adjust VR001 (on IF pack) in the IF pack until the noise disappears from the oscilloscope screen and the waveform nearly comes into sync.

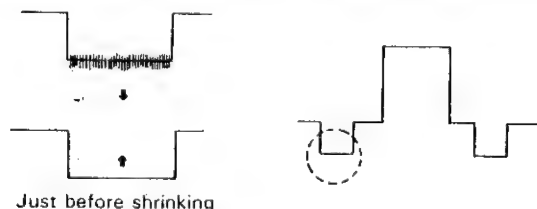


Figure 2-13.

Adjustment of AFT

Measuring instrument	Oscilloscope Signal generator
Mode	_____
Input signal	PIF frequency uniwave (39.5 MHz \pm 1 kHz) Colour bar signal (70 dB μ)
Test point	Video output terminal
Adjusting point	T002 (AFT coil)
Specification	_____

1. Receive the colour bar signal (input field strength: 70 dB μ).
2. First set the band selector switch to VHF or UHF position.
Using the signal generator, feed the 39.5 MHz PIF frequency signal (sine wave) to the tuner IF output terminal.
Use the (-) and (+) keys so that the video output terminal waveform be minimum.
3. Set the band selector switch normal position.
4. Using the signal generator, feed the 39.5 MHz \pm 1 kHz PIF frequency signal (sine wave) to the tuner IF output terminal.
(Adjust the attenuator to attenuate the input signal down to an appropriate level).
5. Adjust T002 (AFT coil) in the IF pack so that the video output terminal waveform be minimum.

Adjustment of PLL frequency of H-sync ID circuit (R1464)

Measuring instrument	Frequency counter
Mode	_____
Input signal	Video signal
Test point	TP1451
Adjusting point	R1464
Specification	15.625 kHz \pm 50 Hz

1. Connect the frequency counter to pin ③ of TP1451 with a buffer in between, as shown in Fig. 2-14.
2. Add a 1 μ F/50V capacitor between pin ① (video signal) and pin ② (GND) of TP1451, as shown in Fig. 2-14.
(Disconnect this capacitor after the adjustment.)
3. Turn R1464 until the frequency counter reads 15.625 kHz \pm 50 Hz.

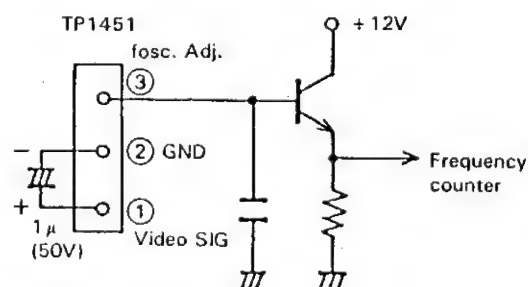


Figure 2-14. Buffer Circuit

TROUBLESHOOTING GUIDE

■ TROUBLES OF CONTROL SYSTEM (SERVO, SYSTEM CONTROLLER CIRCUIT)

No.	Problems	Probable causes and countermeasures
1.	No power is supplied.	<ul style="list-style-type: none"> • The fuse is blown out; check if there occurs a shortcircuit in the internal circuit. • Check if there are produced AT5V, Motor 12V and AT9V in the power circuit; if not, this means that the power circuit is defective. • Check if the system controller (IC801) is normally functioning; check if there are produced reset signals (ACL) at pin 45 of IC801 and clock signal at pins 46 and 47 of IC801. • Check if the power control signal (Low level) goes out of pin 19 of IC801.
2.	No operation is available.	<ul style="list-style-type: none"> • Check if the end sensor signal (cassette housing side) and start sensor signal are applied to pins 56 and 57 of IC801 respectively. • Check if the unit is in timer mode. • Check if the unit is in sensor stop mode. • The cam switch is poorly adjusted for its positioning.
3.	After tape lading, the unit is stopped with the tape kept wound over the drum, or the cassette can't be ejected.	<ul style="list-style-type: none"> • The cam switch is poorly adjusted for its positioning. • IC803 is defective.
4.	The unit will stop immediately after it is set in playback or record mode.	<ul style="list-style-type: none"> • Check if the head switching pulse is applied to pin 3 (for the drum sensor) of IC801. • Check if the drum motor is rotating. • Check if the drum pulse generator's signal is applied to pin 4 of the servo circuit IC701
5.	The unit will stop a few seconds after it has been set in playback or record mode.	<ul style="list-style-type: none"> • Check if the reel sensor pulse is applied to pin 58 (for the reel sensor) of IC801. • Check if the reel motor is rotating. • Check if the reel idler is stained or defective.
6.	The tape is not running (the tape is not taken up).	<ul style="list-style-type: none"> • The reel idler is defective. • The reel brake is defective.
7.	<ul style="list-style-type: none"> • The unit stops sometimes during playback or recording. • The tape can't be taken up when tape unloading. • The tape is scratched when it is wound. • Video search is impossible. 	<ul style="list-style-type: none"> • Check if there are produced capstan motor control signals at the system controller (servo clock signal 38 of IC801, servo data signal at 39 of IC801, capstan motor pull up signal at pin 29 of IC801, capstan motor unloading signal at pin 39 of IC801, loading motor control forward signal at pin 63 of IC801, cassette and loading motors reverse control signal at pin 62 of IC801). • The video search circuit is defective. • IC701 and IC702 are defective.
8.	Fine noises appear at the reproduced picture.	<ul style="list-style-type: none"> • The playback phase generator MM control is misadjusted (R740).

No.	Problems	Probable causes and countermeasures
9.	Noises appear intermittently at the reproduced picture.	<ul style="list-style-type: none"> Check for capstan servo circuit (capstan frequency generator's signal at pin 11 of IC701 and playback control signal at pin 42 of IC701)
10.	The picture collapses in the horizontal direction.	<ul style="list-style-type: none"> The drum servo circuit is defective. Check if there are drum frequency generator's signal applied to pin 7 of IC701 and drum phase generator's signal to pin 4 of IC701. Check if there is reference signal (4.43MHz) at pin 22 of IC701.

• TROUBLES OF SOUND AND REPRODUCED PICTURE (Y/C AND AUDIO CIRCUIT)

No.	Problems		Probable causes and countermeasures
1.	No picture appears.	At E-E mode	<ul style="list-style-type: none"> Check if the video signal (E-E signal) is applied to pin 4 of IC201, if the video signal goes out of pin 10, and if proper voltage is applied to each pin of IC201. Check if the video signal comes into pin 3 of IC2201 and goes out of pin 8 of IC2201 (in tuner mode). Check if the E-E (L) signal is at low level at pin 26 of connector AX and pin 7 of IC2201.
		At playback of standard tape.	<p>Make sure that there appears a normal picture at E-E mode.</p> <ul style="list-style-type: none"> Check if the playback FM signal is applied to pin 7 of connector CE. Check if the playback FM signal is applied to pins 19 and 20 of IC301. Check if Vcc 5V is applied at pin 8 of IC401. Check if the video signal (demodulator output) is given at pin 16 of IC401. Check if the video signal is given at pin 1 of IC401. Check if the base of Q202 is at high level (about 4V).
		At playback of the tape recorded by oneself.	<p>Before this checking, make sure that normal playback is possible with standard tape.</p> <ul style="list-style-type: none"> Check if there is FM signal at pin 16 of IC401. Check if there is video signal at pin 6 of IC201. Check if there is video signal at pin 10 of IC201.
2.	No colour appears.		<ul style="list-style-type: none"> Check if there is chroma signal at pin 30 of IC501. APC is misadjusted (R506). It is not allowed to readjust them, this means that IC501 is defective. Check if IC501 is normally functioning.
3.	The picture collapses when the tape recorded by oneself is played back.		<ul style="list-style-type: none"> Check if there is a normal voltage at each pin of the head amplifier.
4.	Noises appear on the whole of picture when the tape recorded by oneself is played back.		<ul style="list-style-type: none"> Check if there is a normal voltage at each pin of the head amplifier Check the video head or replace it a new one.

No.	Problems	Probable causes and countermeasures
5.	Noises is noticeable at E-E mode or when the tape recorded by oneself is played back.	<ul style="list-style-type: none"> • The tuner and/or RF converter are defective. • Check if AT 5V is applied at pin 5 of the RF converter. • Check the coaxial cable between the tuner and the RF converter for breakage. • Disconnect the antenna cable to see if the DC voltage at the tuner's AGC terminal goes above 6V.
6..	Noise appear on the picture when the tape is played back with standard tape.	<ul style="list-style-type: none"> • Clean the video head or replace it a new one.
7.	There appears no E-E sound.	<ul style="list-style-type: none"> • First make sure the E-E picture appears as specified.(If not, the muting effect is produced.) • ALC at IC601 operates improperly. • Check if there is audio signal at pin 17 of IC601. • The audio muting circuit is defective.
8.	There appears no sound at playback mode.	<ul style="list-style-type: none"> • The audio head is defective. • Check if the control signal is applied. (If not, the muting effect is produced.) • Ckeck if playback audio signal is applied to pin 7 of IC601 and goes out of pin 17.
9.	Sound is distorted.	<ul style="list-style-type: none"> • The audio head is magnetized or defective. • Bias current is insufficient.
10.	The reasonance in the recording or playback is incorrect.	<ul style="list-style-type: none"> • The audio head is magnetized or defective. • Bias oscillator circuit is defective.
11.	Recording is impossible.	<ul style="list-style-type: none"> • Bias oscillator circuit is not normally functioning. • Ckeck if pin 12 of K602 (bias control 9V) is at high level.
12.	Noise and hum appear frequently during playback or recording.	<ul style="list-style-type: none"> • The audio head is defective.

REMOVAL AND REASSEMBLY OF CASSETTE HOUSING CONTROL ASSEMBLY

Notes:

1. During removal and reassembly, be careful not to strike the nearby guide pin, drum, etc.
2. Before removal or reassembly, be sure to unplug the recorder from the AC outlet.
3. When removing and attaching the cassette loading belt, be careful to keep it free from grease.

• Removal

1. Put the unit in the cassette eject position.
2. Remove the cassette loading belt ①.
3. Disconnect the FFC (Full Flat Cable) ② at the right side of the cassette housing control assembly.

Note: Be careful not to break the FFC.

4. Remove the two cassette housing installation screws.
5. Move the cassette housing control assembly (Fig. 1-1) in the direction of arrow ⇒ ③, and pull it out straight upward.

• Reassembly

1. Insert the tabs of the cassette housing control assembly into the mechanism chassis, move it in the direction of arrow ⇒ ④, and secure temporarily.
Check to see if the cassette housing control assembly is in the correct position, and then tighten the two screws (XHP5330P06WS0).
2. Attach the cassette loading belt ①.
3. Connect the FFC ② at the right side of the cassette housing control assembly.

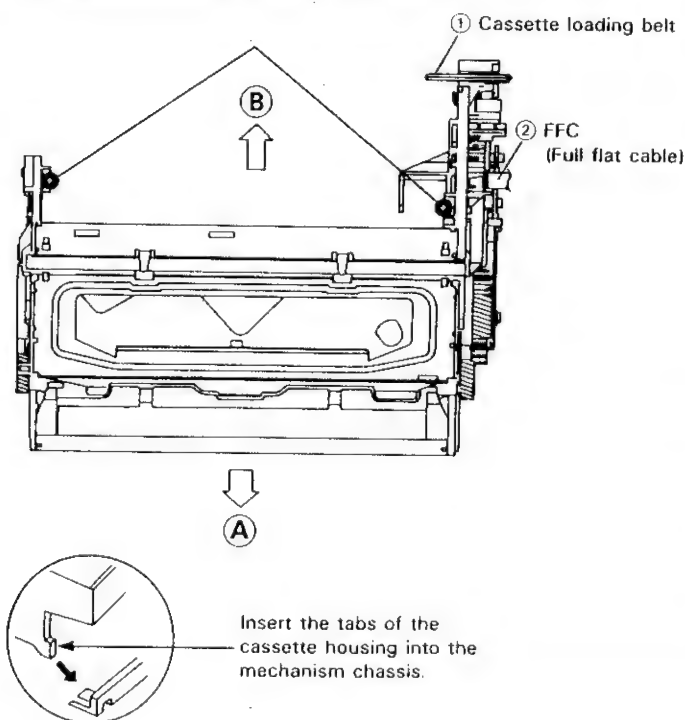


Figure 1-1.

REPLACEMENT OF WORM WHEEL ASSEMBLY

• Removal (Fig. 1 - 2)

1. Unsolder the cassette switch connector from the start sensor PWB ①.
2. Release the two catches ② on the cassette housing frame (R), and remove the PWB.
3. Unscrew one B tight screw ③ to detach the worm bracket ④.

Note: The bearing ⑤ can come off position too. So be careful not to let the bearing fall.

4. Remove the worm shaft assembly ⑥, pulley ⑦ and cassette loading belt ⑧ all from the cassette housing frame (R).
5. Finally pull the worm wheel assembly out of the boss of the cassette housing frame (R).

• Reassembly (Fig. 1-2)

1. Turn the phase gear ⑨ clockwise until the slider comes to a halt in the cassette insertion direction.
2. Set up the worm wheel gear assembly onto the boss on the cassette housing frame (R), matching the mark ⑩ on the phase gear ⑨ with the mark ⑪ on the worm wheel gear.
Note: Make sure that the slider pin is in the groove of the drive gear arm.
3. Install the pulley ⑦ and apply the cassette loading belt ⑧ both on the worm shaft assembly ⑥. Couple the clutch ⑫ to the clutch lever ⑬. And mount them together in the cassette housing frame (R).
4. Attach the worm bracket ④ to the worm shaft assembly ⑥. Place them onto the boss on the cassette housing frame (R).
5. Tighten one B tight screw ③.

Note: Make sure that the parts ④ and ⑤ of the cassette housing frame (R) are properly engaged with the parts ⑥ and ⑦ of the worm bracket ④.

6. Hook the start sensor PWB ① on the two positions ② on the cassette housing frame (R).
Note: Check that the switch connector is right in the cassette switch mounting hole ③.
7. Finally resolder the cassette switch connector to the start sensor PWB.

Notes:

1. Do not overtighten the B tight screw (no more than 5.0 ± 0.5 kg. cm), because otherwise the lower threads of the screw hole at the resin-made boss may be broken.
2. Keep in mind that the clutch switching lever should be in the correct positional relation. The mechanism might malfunction even if the lever comes slightly out of position.

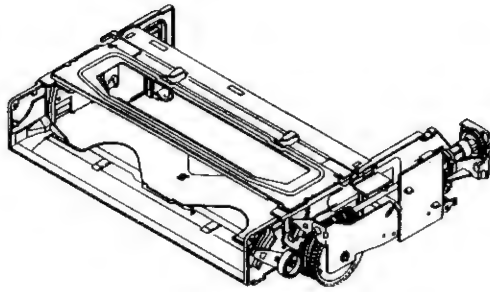


Figure 1-2 (a).

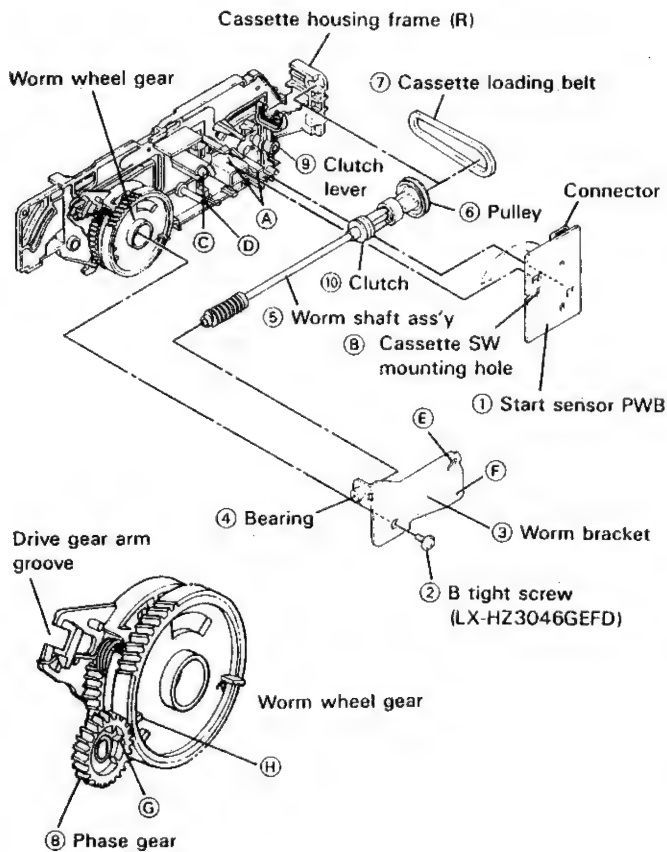


Figure 1-2 (b).

● Reassembly of drive gear (Fig.1- 3)

1. Pass the tip ⑧ of the drive gear spring (R) ② through the square hole ④ of the drive gear (R) ① to the hook the spring in position.
2. Hook one end ⑩ of the reciprocating spring ③ to the catch ⑥ of the drive gear (R) ①.
3. Hook the other end ⑪ of the reciprocating spring ③ to the catch ⑦ of the worm wheel ④.
4. Fit the drive gear (R) ① to the worm wheel ④ so that the catch ⑥ and boss ⑩ on the drive gear (R) are exactly in the square hole ④ and round hole ①, respectively, in the worm wheel.

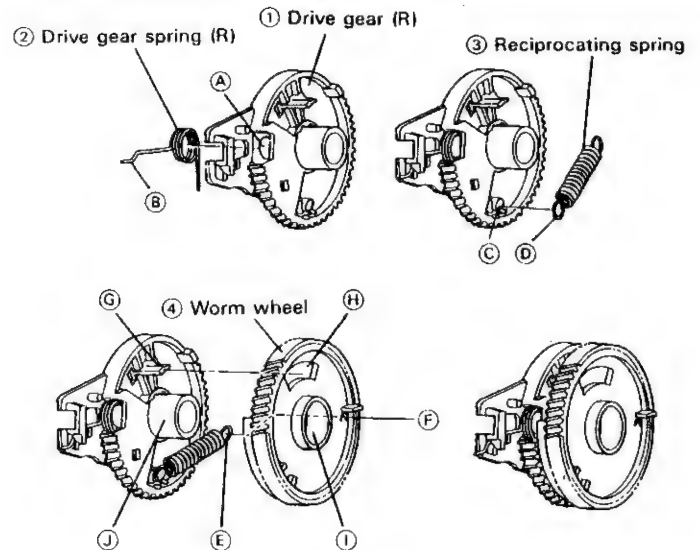


Figure 1-3.

REPLACEMENT OF CASSETTE LOADING BELT

● Replacement (Fig. 1-4)

1. Remove the start sensor PWB and worm bracket from the cassette housing frame (R).
2. Remove the worm shaft assembly, pulley and cassette loading belt from the cassette housing frame (R).
3. Replace the cassette loading belt with a new one.

Notes:

1. Do not overtighten the B tight screw which holds the worm bracket in position. The specified tightening torque is $5.0 \pm 0.5 \text{ kg. cm}$.
2. Make sure that the cassette loading belt, being applied in the cassette housing frame (R), is free from grease. If stained with grease, clean the belt with the specific cleaning liquid.
3. Finally check the clutch switching lever for its specified points.

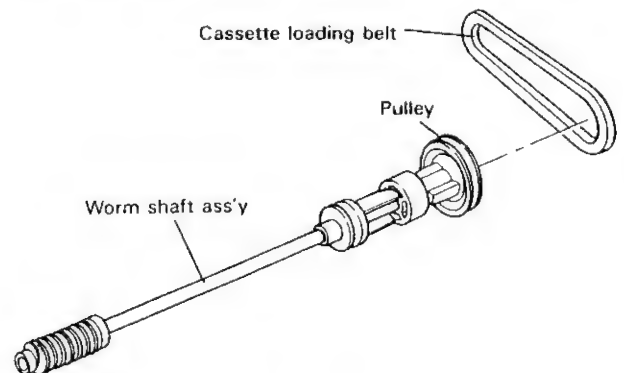


Figure 1-4.

CHECKING THE CLUTCH SWITCHING LEVER

• Checking (Fig. 1-5)

When removing and attaching the clutch switching lever from and to the mechanism chassis, check to see if the lever is in the position as shown below. If out of this position, malfunction might result.

1. First make sure that the rib (A) of the drive gear (R) ① and the tip (B) of the switch lever ② are in their correct positions.
2. Check also that the rib (C) of the cassette housing frame (R) and the catch (D) of the clutch lock lever ③ are in their proper positions.
3. Finally be sure that the positional relations between the clutch lever ④ and the clutch ⑤, as well as between the clutch ⑤ and the pulley ⑥, are as specified.

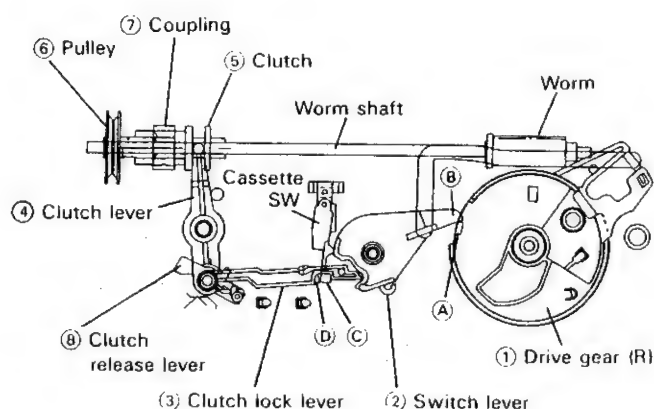


Figure 1-5.

• Resetting (Fig. 1-6)

Take the following steps to reset the clutch ⑤ if it is unlocked or if the switch lever ② and clutch lock lever ③ are unlocked.

1. Turn the coupling ⑦ clockwise (as viewed from the front of the set) until the slider comes to the position indicated below.

Note: Notice that the slider is equipped with a lock mechanism. Unlock the slider, therefore, before shifting the slider.

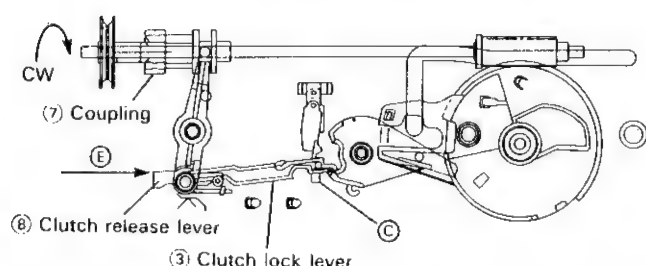


Figure 1-6.

2. Now push the clutch release lever ⑧ in the direction of arrow (E) by hand until the clutch lock lever ③ becomes tightly locked by the part (C) of the cassette housing frame (R).

3. Then turn the coupling ⑦ counterclockwise until the slider reaches the cassette insertion opening and the reciprocating spring is activated.

Note: There is no need to lock the slider. Just keep shifting the slider.

REPLACEMENT OF LOCK RELEASE LEVER

• Removal (Fig. 1-7)

1. Turn the coupling clockwise until the slider ① comes to the cassette down position.

Note: Before shifting, unlock the slider.

2. Slightly widen the cassette housing frames (R) and (L) to unhook the parts (A) of the slider holders (R) and (L) off the grooves of the above frames.

3. Press the catch (B) on the slider holder (R) ②, and let the slider ① go off this holder in the direction of arrow (C).

4. Take the lock release lever ass'y ③ out of the slider holder (R) ②.

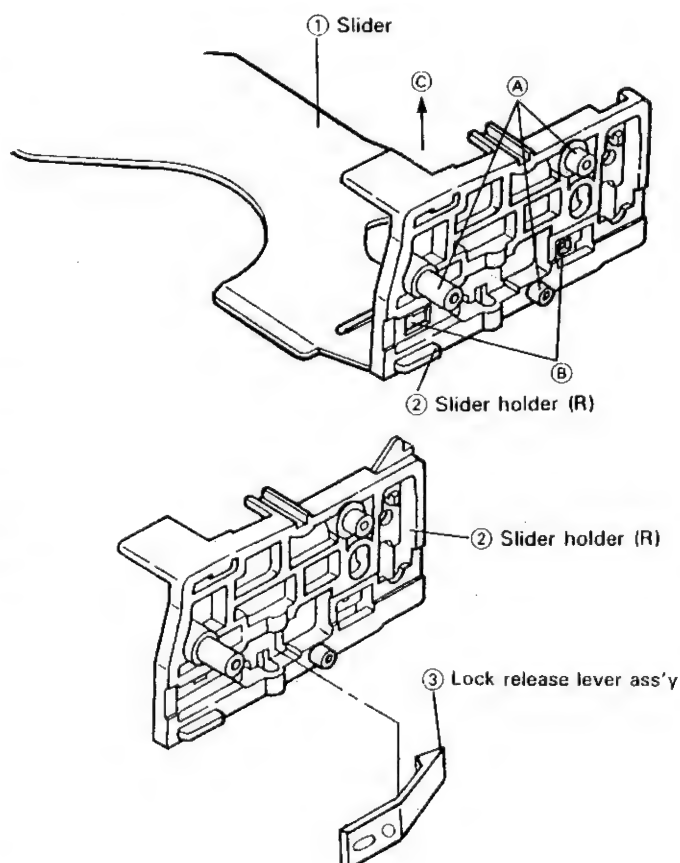


Figure 1-7.

● Reassembly (Fig. 1-7)

1. Attach the lock release lever ass'y ③ to the slider holder (R) ②.
2. Fit the slider holder (R) ② to the slider ①.
3. Slightly widen the cassette housing frames (R) and (L), and set the parts ④ of the slider holders (R) and (L) to the grooves of the cassette housing frames (R) and (L).

Note: Make sure of the following fitting: Fitting between the parts ④ of the slider holders (R) and (L) and the grooves of the cassette housing frames (R) and (L), as well as between the drive gear arms and the slider holders (R) and (L).

4. Turn the coupling counterclockwise until the slider ① comes to the cassette insertion opening.

TO RUN A TAPE WITHOUT THE CASSETTE HOUSING CONTROL ASSEMBLY

1. Open the lid of a cassette tape by hand and hold it with a piece of vinyl tape.
2. Set the cassette tape in the tape mechanism. Then, stabilize the cassette tape with a weight (500g or less).

Note: The weight should not be more than 500g.

REMOVAL AND HEIGHT ADJUSTMENT OF REEL DISKS

● Removal of supply reel disk:

1. Remove the cassette housing control assembly.
2. Set the mechanism in the playback mode with no cassette tape in place. Unplug the power cord.
3. Remove the tension band ⑧.
4. Unscrew the screw ⑩ and release the cassette housing control ground spring ⑫ off the reel disk catch ①.
5. Release the supply reel disk catch ① and back tension lever ②. Pull out the supply reel disk ③ upward.

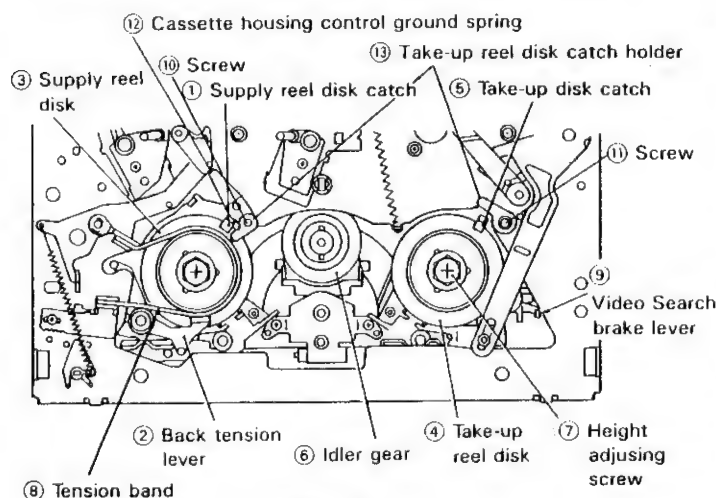


Figure 1-8.

● Removal of take-up reel disk:

1. Remove the cassette housing control assembly.

2. Set the mechanism in the playback mode with no cassette tape in place. Unplug the power cord.
3. Unscrew the screw ⑪ and release the take-up reel disk catch holder ⑬ off the reel disk catch ⑤.
4. Release the take-up reel disk catch ⑤. Pull out the take-up reel disk ④ upward.

Notes:

1. After replacing either of the reel disks, be sure to perform the height adjustment procedure.
2. Take care not to deform the tension hand.
3. Be careful not to deform the back tension lever, main supply / take - up brake levers, video search brake lever and auxiliary fast forward brake. (See pages 4 and 5.)
4. Check the tension pole position. (See pages 15.)
5. Be careful not to damage the supply reel disk, take-up reel disk and idler gear ⑥.
6. Whenever replacing, clean and lubricate the reel disk shaft.

● Reassembly of supply reel disk:

1. Clean the reel disk shaft and apply oil (high quality spindle oil) to it, then install a new supply reel disk onto the shaft.
2. Replace the cassette housing control ground spring ⑫ in position and tighten up the screw ⑩.
3. Replace the tension band ⑧.
4. Adjust the reel disk height by using the master plane and reel disk height adjusting jig.

● Reassembly of take-up reel disk:

1. Clean the reel disk shaft and apply oil (high quality spindle oil) to it. Then, release the video search brake lever and install a new take - up reel disk onto the shaft.
2. Replace the take-up reel disk catch holder ⑬ in position and tighten up the screw ⑪.
3. Adjust the reel disk height by using the master plane and reel disk height adjusting jig.

Notes:

1. During removal and reassembly, be careful not to damage the reel disks, reel shafts, idler gear and brake levers.
2. After reassembly, check the back tension in video search rewind mode (see page 14) and checking the brake torque (see page 16)

HEIGHT ADJUSTMENT

1. Remove the cassette housing assembly, and place the master plane onto the mechanism unit as shown in Fig.1-9 (a), taking care not to hit the drum.
2. Ensure that the reel disk is lower than the part ① but higher than the part ② of Fig. 1-9 (b), by using the reel disk height adjusting jig. If the height is not correct, adjust the height adjusting screw.

Note: Whenever replacing the reel disk, perform the height adjustment.

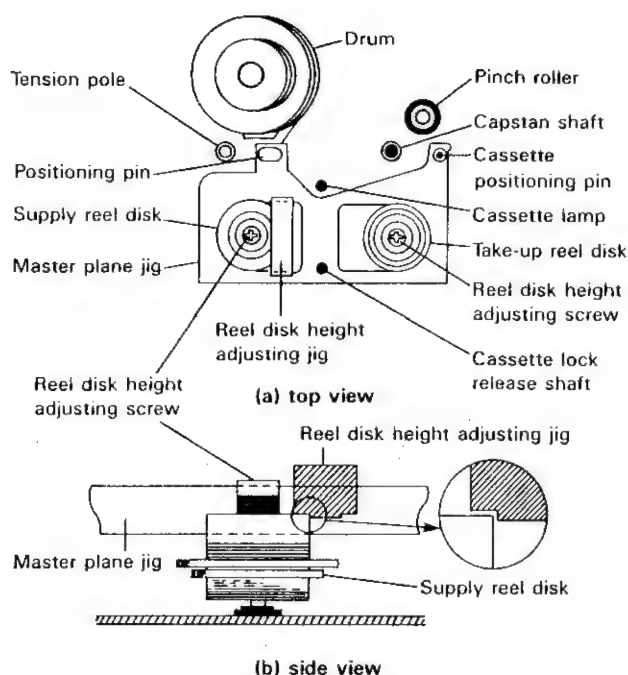


Figure 1-9.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN FAST-FORWARD MODE

Notes:

1. When setting the torque gauge on the take-up reel disk and pushing the fast-forward button to start the reel disk turning, take care that the torque gauge does not fly off.
2. The checking and adjustment should be carried out without a video cassette tape in place.

• Checking

1. Remove the cassette housing assembly.
2. Place the torque gauge on the take-up reel disk and push the fast-forward button to place the unit in the fast-forward mode.
3. Turn the torque gauge slowly (one rotation every 2 to 3 seconds) by hand in the take-up direction and check that it indicates 700 g.cm or more.

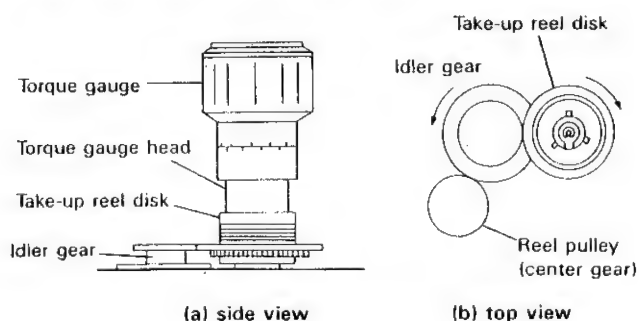


Figure 1-10.

• Adjustment

If the take-up torque is outside the specified range, clean the capstan D.D. motor pulley, reel belt and reel pulley with cleaning liquid, then recheck the torque.

If the take-up torque is still out of specification, replace the reel belt.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN REWIND MODE

Notes:

1. When setting the torque gauge on the supply reel disk and pushing the rewind button to start the reel disk turning, take care that the torque gauge does not fly off.
2. When checking the take-up torque, do not keep the reel disk locked for a longer time.

• Checking

1. Remove the cassette housing assembly.
2. Place the torque gauge on the supply reel disk and push the rewind button to place the unit in the rewind mode.
3. Turn the torque gauge slowly (one rotation every 2 to 3 seconds) by hand in the take-up direction and check that it indicates 700 g.cm or more.

• Adjustment

If the take-up torque is outside the specified range clean the capstan DD motor pulley, reel belt and reel pulley with cleaning liquid, then recheck the torque.

If the take-up torque is still out of specification, replace the reel belt.

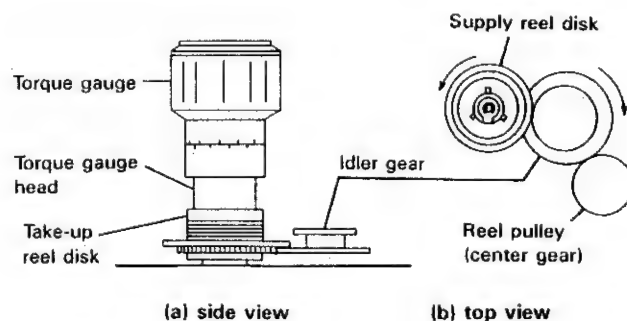


Figure 1-11.

CHECKING OF TAKE-UP TORQUE IN PLAY-BACK MODE

• Checking

Load a cassette torque meter (JiGVHT-063) into the unit and push the record button to place the unit in the record mode. Then check that the torque is as specified;

torque: 95 ± 30 g.cm

Note:

The measured torque fluctuates due to the rotational deviation of the reel drive unit. Use the center of the fluctuating range as the measured value.

1. If the take-up torque in playback mode is outside the specified value, replace the take-up reel disk.
2. Push the record button to place the unit in the record mode, and check that the take-up torque is within the specified range.

CHECKING OF TAKE-UP TORQUE IN VIDEO SEARCH REWIND MODE

- **Checking**

Load a cassette torque meter (JiGVHT-O63) into the unit and push the play and video search rewind buttons to place unit in the video search rewind mode.

Then check that the torque is as specified;

torque in video search rewind mode : 170 ± 40 g.cm

Note:

The measured torque fluctuates due to the rotational deviation of the supply reel disk. Use the center of the fluctuating range as the measured value.

1. If the take-up torque in video search rewind mode is outside the specified range, replace the supply reel disk.

CHECKING THE FAST FORWARD BACK TENSION

Note:

Set the torque gauge securely on the supply reel disk; if the torque gauge is loose above the reel disk, an inaccurate measurement will result.

- **Checking**

1. Remove the cassette housing assembly.
2. Push the fast forward button to place the unit in the fast forward mode.
3. Place the torque gauge on the supply reel disk, and turn it clockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within 15 ± 5 g.cm.

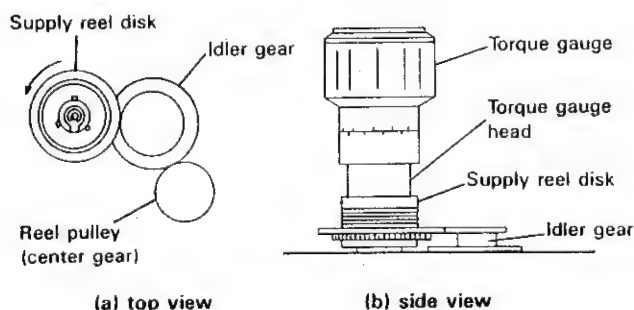


Figure 1-12.

CHECKING THE REWIND BACK TENSION

Note:

Set the torque gauge securely on the take-up reel disk; if the torque gauge is loose above the reel disk, an inaccurate measurement will result.

- **Checking**

1. Remove the cassette housing assembly.
2. Push the rewind button to place the unit in the rewind mode.
3. Place the torque gauge on the take-up reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within 15 ± 5 g.cm.

CHECKING THE VIDEO SEARCH REWIND BACK TENSION

Note:

Set the torque gauge securely on the take-up reel disk; if the torque gauge is loose above the reel disk, an inaccurate measurement will result.

- **Checking**

1. Remove the cassette housing assembly.
2. Push the play button to place the unit in the playback mode.
3. Push the video search rewind button to place the unit in the video search rewind mode.
4. Place the torque gauge on the take-up reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within 40 ± 10 g.cm.

CHECKING THE PINCH ROLLER PRESSURE

1. Remove the cassette housing assembly.
2. Push the play button to place the unit in the playback mode.
3. Hook the tension gauge adapter around the pinch roller shaft.
4. Using a tension gauge, pull the pinch roller in the direction of arrow \Rightarrow ① so that the pinch roller moves away from the capstan shaft.
5. Gradually release the pressure in the direction of arrow \Rightarrow ② to allow the pinch roller to touch the capstan shaft. When the pinch roller just touches the capstan shaft, read the indication on the gauge.
6. Check that the reading of the tension gauge is in the range of 1000 to 1200 gr.

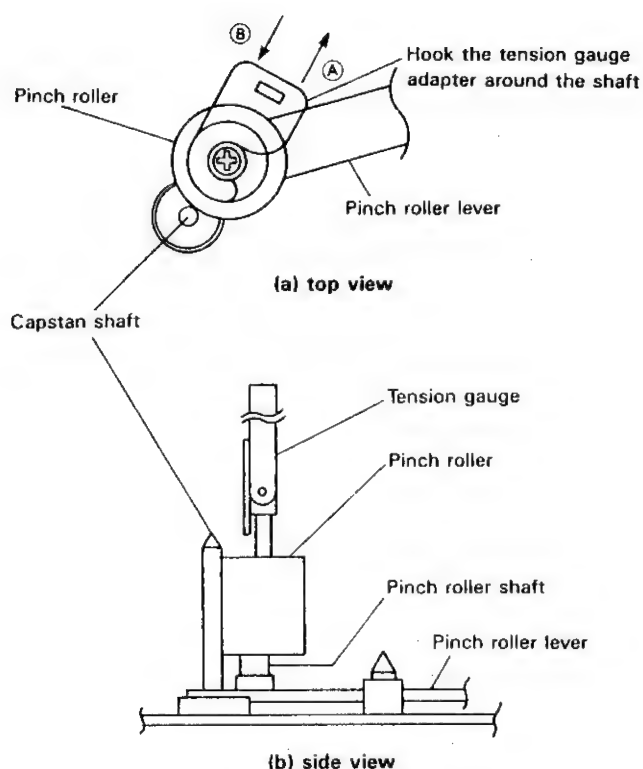


Figure 1-13.

ADJUSTMENT OF TENSION POLE

• Position checking (Fig. 1-14)

1. Remove the cassette housing assembly.
2. Set a video cassette tape and push the record button to place the unit in the record mode.
3. The pole bases (see page 4; item 19 and 27.) operate to bring the tape outside the cassette housing and simultaneously the tension pole moves to the left, loading the tape. At that time (loading mode), check the position of the tension pole.

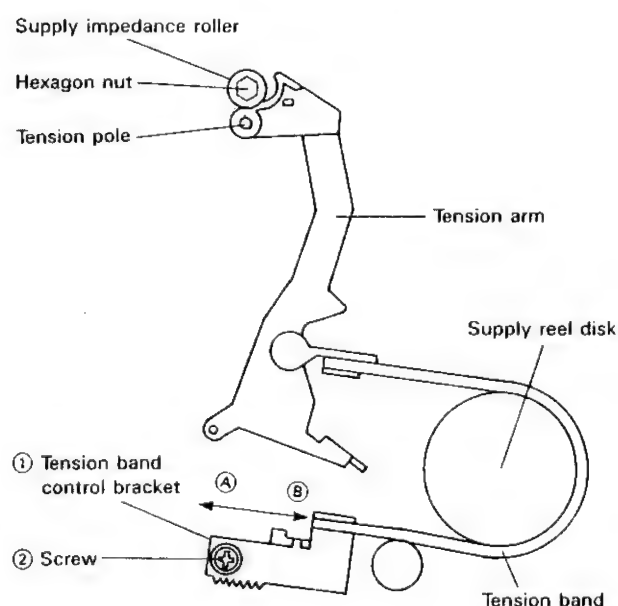


Figure 1-14.

4. At the end of the tape (E-180), check that the tension pole's center is aligned with the supply impedance roller's center.
5. Check that the tape is neither curled against the flange of the supply impedance roller nor mounted over it.
6. During the video search rewind mode with no cassette tape in place, check the supply reel disk is free of the tension band.

• Position adjustment (Fig. 1-15)

1. If the tension pole is at the right of the supply impedance roller's center, shift the tension band control bracket ① in the direction of arrow \Rightarrow B, and tighten the screw ②.
2. If the tension pole is at the left of the supply impedance roller's center, shift the tension band control bracket ① in the direction of arrow \Rightarrow A, and tighten the screw ②.

ADJUSTMENT OF RECORD/PLAYBACK BACK TENSION

• Checking

1. Remove the cassette housing assembly.
2. Put a torque cassette meter into the unit.
3. Push the record button to place the unit in the record mode. Check that the reading of the cassette meter is 23 to 28 g.cm.
4. Make sure the video cassette tape is wound over the retaining guide.
5. Make sure that the tape is not slack nor damaged at both ends.

• Adjustment (Fig. 1-15)

1. If the back tension is lower than specified, move the tension spring hook plate ① in the direction of arrow A so that the protuberance behind be tight in the hole.
2. If the back tension is higher than specified, move the tension spring hook plate ① in the direction of arrow B so that the protuberance behind be tight in the hole.

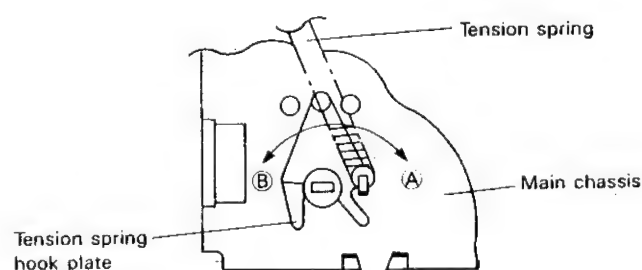


Figure 1-15.

Figure 1-16. Not used.

CHECKING THE BRAKE TORQUE

A) Checking the brake torque at the supply side.

• Checking

1. Remove the cassette housing assembly.
2. Check that the mechanism is in the stop mode.

Note: The stop mode is brought about by unplugging the power cord with the mechanism in the fast forward or rewind mode.

3. Separate the idler gear from the supply reel disk and place the torque gauge on the supply reel disk.
4. Slowly rotate the torque gauge in the clockwise (CW) direction of the supply brake so that the reel disk and the gauge needle rotate at the same speed. Do the same in the counterclockwise (CCW) direction of the supply brake. Check that the values are within the specified range (CW direction = 280 to 720 g.cm, CCW direction = 110 to 230 g.cm) and that the brake torque in the CW direction is at least twice as high as that in the CCW direction.

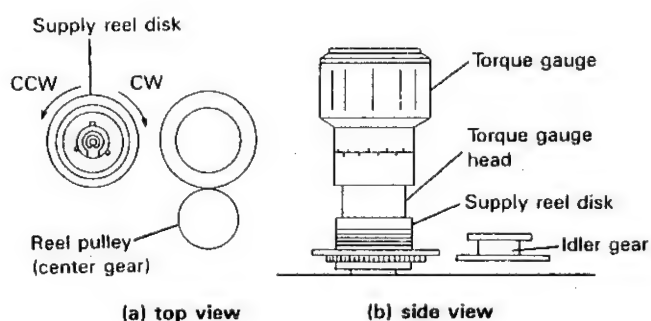


Figure 1-17.

• Adjustment

1. If the supply brake torque is outside the specified range (CW direction = 280 to 720 g.cm, CCW direction = 110 to 230 g.cm), clean the supply reel disk and brake lever felt, then recheck the torque.
2. If the supply brake torque is still outside the specified range, replace the main brake spring.

B) Checking the brake torque at the take-up side.

• Checking

1. Remove the cassette housing assembly.
2. Check that the mechanism is in the stop mode.

Note: The stop mode is brought about by unplugging the power cord with the mechanism in the fast forward to rewind mode.

3. Separate the idler gear from the take-up reel disk and place the torque gauge on the take-up reel disk.

- Slowly rotate the torque gauge in the CCW direction of the take-up brake so that the reel disk and the gauge needle rotate at the same speed. Do the same in the CW direction of the take-up brake. Check that the values are within the specified range (CCW direction = 280 to 720g.cm, CW direction = 90 to 200 g.cm) and that the brake torque in the CCW direction is at least twice as high as that in the CW direction.

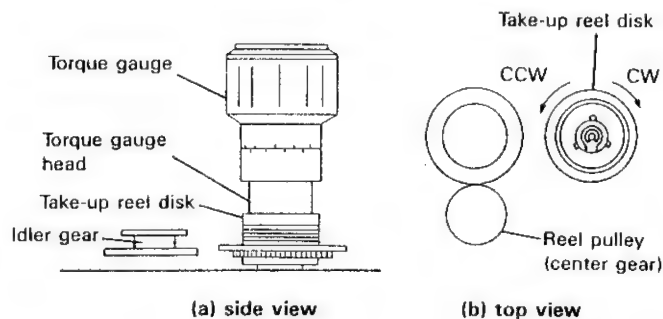


Figure 1-18.

● Adjustment

- If the take-up brake torque is outside the specified range (CCW direction = 280 to 720g.cm, CW direction = 90 to 200 g.cm), clean the take-up reel disk and brake lever felt, then recheck the torque.
- If the take-up brake torque is still outside the specified range, replace the main brake spring.

REPLACEMENT OF A/C (Audio/Control) HEAD

Note:

After replacement, perform the adjustment of tape drive train. Under any circumstances avoid touching the head (indicated by "⇒" in Fig. 1-20(c)).

●Replacement (See Figs. 1-19 and 1-20.)

- Loosen the tilt adjusting screw ⑥ by using Phillips screwdriver.
- Remove the azimuth adjusting screw ⑤ with a Phillips screwdriver.
- Remove the A/C head screw ④ with a Phillips screwdriver, paying attention to the spring ⑦ between the A/C head screw ④ and A/C head pedestal.

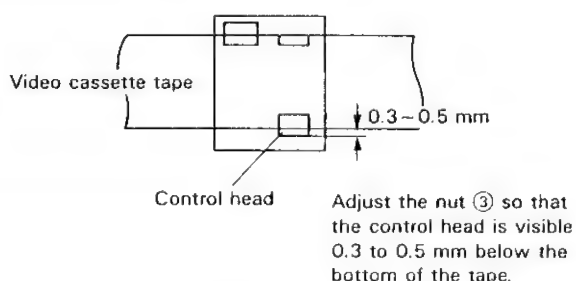


Figure 1-19.

- Remove the A/C head PWB ⑧ soldered to the A/C head assembly, and solder the A/C head PWB ⑧ onto a new A/C head assembly.
- The A/C head assembly ① is attached so that the A/C head arm ② and A/C head pedestal are roughly parallel to each other.

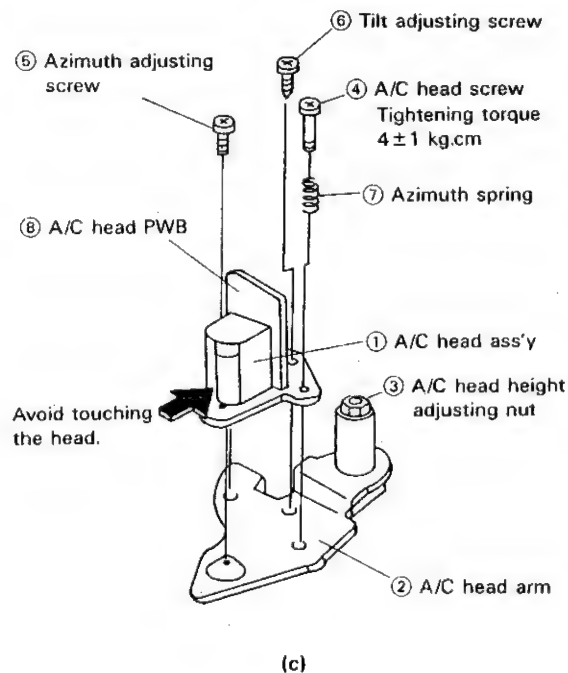
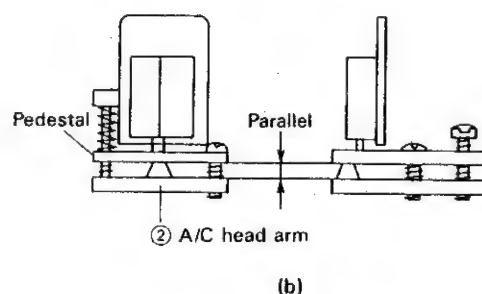
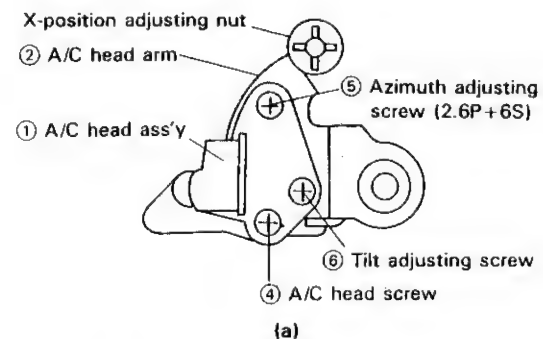


Figure 1-20.

6. Set the A/C head tilt angle according to Fig. 1-22.
7. Play an alignment tape and roughly adjust the height of the A/C head, visually, by turning the A/C head adjusting hexagon nut ③ with the box driver (JiGDRIVER110-7) until the tape comes to the position shown below. (See Fig. 1-19.)
8. Set the mechanism to the loading mode. Place the A/C head tilt adjusting jig on the main chassis as shown in Fig. 1-21. Slowly turn the tilt adjusting screw ⑥ with a Phillips screwdriver until there is no gap between the jig and the A/C head.

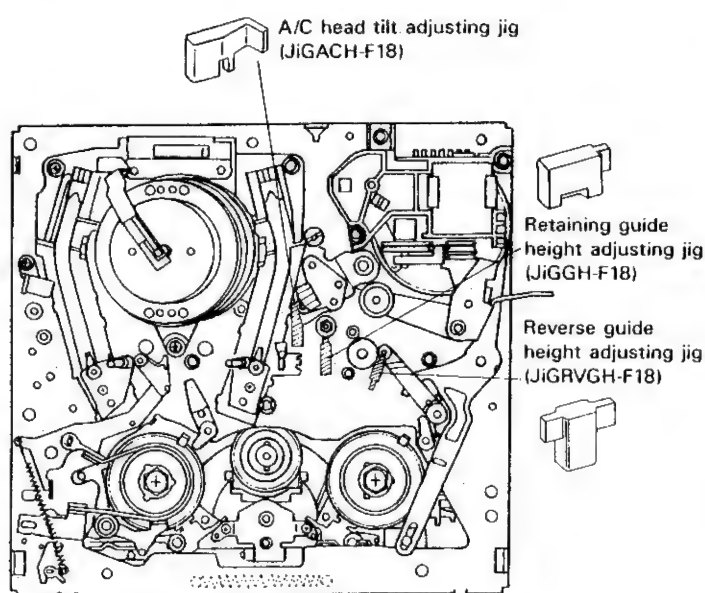


Figure 1-21.

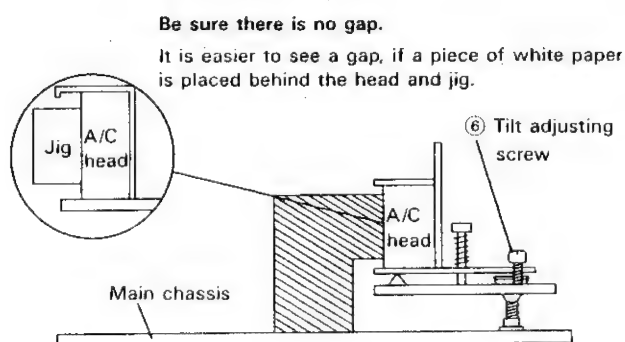


Figure 1-22.

HEIGHT ADJUSTMENT OF RETAINING GUIDE AND REVERSE GUIDE

• Adjustment

1. Before the rough adjustment of tape drive train, check that the retaining guide and reverse guide heights are within the specified values of Fig. 1-23, by using the special jigs.
2. If the retaining guide height is not correct, adjust the height with the box driver (JiGDRIVER110-4).
3. If the reverse guide height is not correct, use the height adjusting washers.

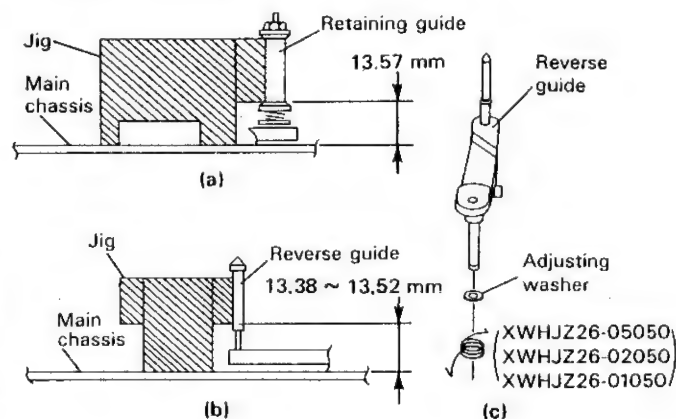


Figure 1-23.

ADJUSTMENT OF TAPE DRIVE TRAIN

1. Check and adjust the position of the tension pole and the back tension. (See pages 15)
2. Set the tilt angle of the A/C head as shown in Fig. 1-22.

Note:

If the A/C head is adjusted, check and set the tilt angle as in the case of replacement.

3. When the above adjustments have been completed, roughly adjust the tape drive train using an alignment tape.
 - a. Connect the oscilloscope to the test points for PB chroma output (TP501) and head switching pulse (TP502). Allow the PB CHROMA signal to be triggered by the head switching pulse of TP502.
 - b. Loosen the setscrew of the guide roller, and tighten it loosely by using the special bladed screwdriver (JiGDRIVERH-4) to such an extent that the guide roller turns smoothly.
 - c. Set the alignment tape (VROCPSV) on the reel disk.

Note:

Attach a 400 to 500g. weight to the cassette tape when a cassette tape is placed on the reel disk with the cassette housing assembly removed.

- d. Place the unit to the playback mode.
 - e. Observe the waveform of the PB chroma, and push the (+) or (-) tracking button to check for a flat PB chroma. This adjustment is satisfactory if a flat response is obtained on the waveform of the PB chroma when the (+) or (-) tracking button is pushed. If a flat response cannot be obtained roughly adjust the guide roller using the special bladed screwdriver until the PB chroma output is flat.
While keeping the both (+) and (-) tracking buttons down, adjust the X-position adjusting nut so that the PB CHROMA envelope becomes almost maximum. In the case of rough adjustment, pay particular attention to the outlet side (see Fig. 1-24).
 - f. Adjust the retaining guide height so that the lower flange of the retaining guide touches the bottom edge of the tape. At that time, check that the tape is not curled nor wrinkled.
4. The A/C head height and azimuth are adjusted after rough adjustment of the tape drive train has been done.
- a. Use the alignment tape and play back its audio 7kHz signal (monoscope pattern for video signal) and observe the audio output on an oscilloscope.
 - b. Adjust the azimuth adjusting screw so as to obtain the maximum audio output.
 - c. Use the alignment tape and play back its audio 1kHz signal (colour bar for video signal) and slowly rotate the A/C head height adjusting nut with the special box driver so as to obtain the maximum audio output.
 - d. After the height adjustment, use the alignment tape and play back its audio 7kHz signal (monoscope pattern for video signal) again and adjust the azimuth adjusting screw so as to obtain the maximum audio output. After this adjustment, apply glyptal to the screws and nuts to fix them.
5. The final adjustments of tape drive train and X-position are adjusted after adjustment of the A/C head has been completed.
- a. Connect the oscilloscope to the test points for PB chroma output (TP501) and head switching pulse (TP502). Allow the PB CHROMA signal to be triggered by the head switching pulse of TP502.
 - b. Play back the tape drive train alignment tape (VROCPSV).
 - c. Finely adjust the guide roller's height, observing the envelope on the oscilloscope. Push the (+) or (-) tracking button while adjusting the guide roller, in order to obtain an envelope waveform which is as flat as possible. If the tape is above or below the helical lead, the PB chroma waveform will take the shape shown in Fig. 1-26. Adjust for maximum flatness of the envelope according to the figure.
- Note:**
Adjustment is made for CH-1 of switching pulse (low level). The broken lines indicate the envelope waveform when the tape does not run properly. Push the (+) or (-) tracking button to check the envelope waveform. After adjustment, tighten the setscrew of the guide roller firmly. Play back the alignment tape (VROCPSV) again in the unloading mode, and make sure that there is no change in the PB chroma output.

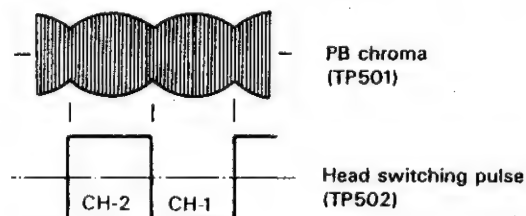


Figure 1-24.

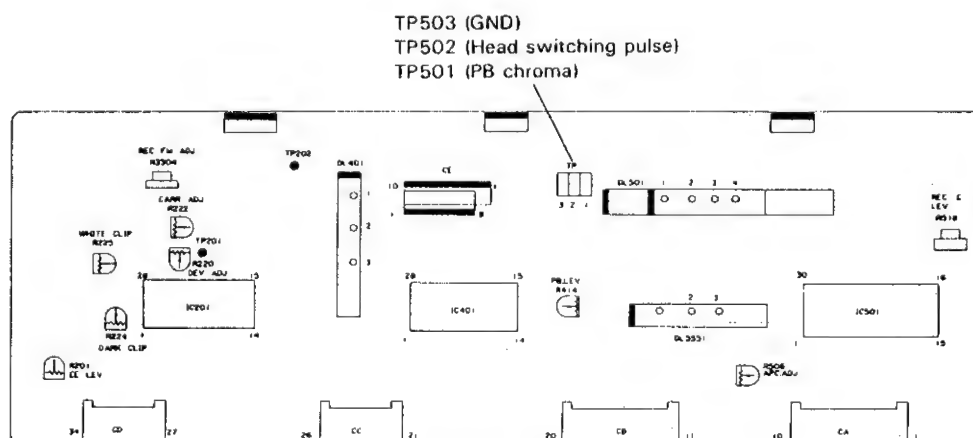


Figure 1-25.

	When the tape is above the helical lead.		When the tape is below the helical lead.	
	Supply side	Take-up side	Supply side	Take-up side
Adjustment	Supply side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope.	Take-up side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope.	Supply side guide roller rotated in counterclockwise direction (raises guide roller) to have the tape float above the helical lead. The supply side guide roller is then rotated in the clockwise direction to flatten the envelope.	Take-up side guide roller rotated in counterclockwise direction (raises guide roller) to have the tape float above the helical lead. The take-up side guide roller is then rotated in the clockwise direction to flatten the envelope.

Figure 1-26.

- d. Adjust the retaining guide height so that the lower flange of the retaining guide touches the bottom edge of the tape. At that time, check that the tape is not curled nor wrinkled.
- e. The X-position is adjusted after tape drive train adjustment. Push the (+) and (-) tracking buttons at the same time to set the tracking buttons to the preset mode, and rotate the X-position adjusting nut shown in Fig. 1-27 with the special bladed screwdriver for maximum switching pulse low side envelope, and then adjust the A/C head position. Now adjust the play back switching point to $6.5 \pm 0.5H$. Check the flatness of envelope and sound by selfrecording.

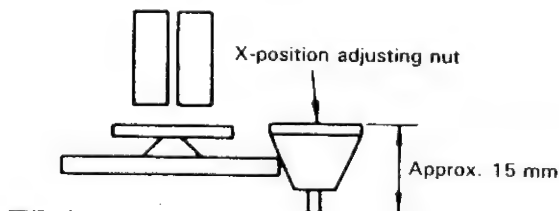


Figure 1-27.

REPLACEMENT OF UPPER DRUM

Note:

The engagement between the lower drum (outer diameter) and the upper drum (inner diameter) is very accurate, in the order of microns, and care should be paid to their replacement. Even a slight entry of foreign material will affect the accuracy of their reassembly.

• Replacement (See Fig. 1-28)

1. Unsolder the leads ① to ④ from the video head and remove them.
2. Remove the two screws ⑤ (brass screws with washers) using a Phillips screwdriver.

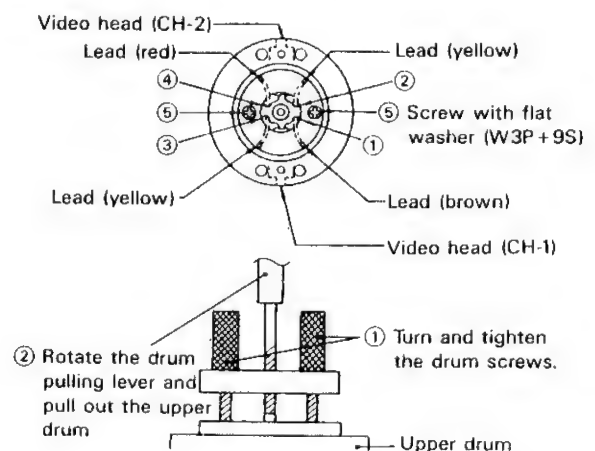


Figure 1-28.

3. Withdraw the upper drum by pulling it up with the upper drum replacement jig.

Notes:

1. Avoid touching the drum surface with bare hands.
2. Do not hit the screws when tightening them.

● **Reassembly**

1. Set a new drum for replacement, as shown in Fig. 1-28, and position the leads properly.

Notes:

1. Before replacing the upper drum, check that there are no scratches or dust on the edge or the outer surface of the lower drum.
2. Before replacing the upper drum, check that there are no scratches or dust on the edge or the inner surface of the upper drum.
3. On assembling these parts, slowly insert the upper drum onto the lower drum with the upmost care, so that the upper drum is not tilted.
4. When assembling these parts, do not allow foreign material to come between them.
5. Do not use excessive force when driving in the screws.

2. Fasten the upper drum in place with the two screws ⑤.

3. Solder the leads ① to ④ at their respective pads.

Note:

Soldering should be performed quickly and carefully without touching adjacent patterns.

4. After replacement, be sure to check the tape drive train adjustment and the following.

- Adjustment of the playback switching point (See page 26).
- Checking and adjustment of the X-position (See page 27).
- Adjustment of SP slow tracking preset (See page 26).

REPLACEMENT OF D.D. (DIRECT DRIVE) MOTOR

Note:

Put the unit in the cassette eject position.

● **Removal**

1. Remove the six screws from the bottom panel and remove the bottom panel.
2. Disconnect the drum D.D. motor lead connector.
3. Remove the two screws ① which hold the D.D. rotor assembly in place, using a Phillips screwdriver.
4. Remove the D.D. rotor assembly.
5. Remove the three screws ② which hold the D.D. stator assembly in place, using a Phillips screwdriver.
6. Remove the D.D. stator assembly.

● **Reassembly**

1. Place the D.D. stator assembly on top of the lower drum.
2. Secure the D.D. stator with the three screws ② using a Phillips screwdriver.

Note:

Be careful not to scratch the core, windings or Hall device.

3. Install the D.D. rotor assembly onto the drum shaft.

Note:

Install the assembly directly onto the direction of the shaft. (Refer to Fig. 1-29 for the installation direction.)

4. Secure the D.D. rotor assembly with the screws ①.
5. Connect the drum D.D. motor lead connector.
6. Install the bottom panel with six screws.

Note:

Be careful not to damage the upper drum or the video head.

7. After replacement of the D.D. motor as shown above, proceed with the adjustment of the playback switching point.

Notes:

1. Be careful not to damage the upper drum or the video head.
2. Be sure that the Hall device and the D.D. stator assembly are not damaged by the D.D. rotor assembly or other parts.

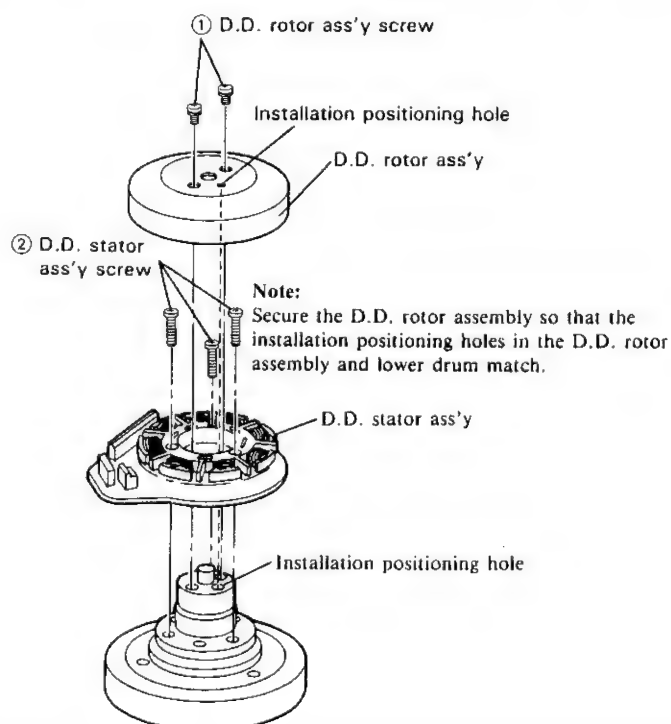


Figure 1-29.

REPLACEMENT OF THE CAPSTAN D.D. (DIRECT DRIVE) MOTOR

● Removal

1. Remove the FFC ① from the capstan D.D. motor control PWB ②.
2. Remove the three screws ③, and remove the capstan D.D. motor ④ from the main chassis.

● Reassembly

1. Mount the capstan motor on the main chassis while making sure not to allow the capstan shaft to hit the main chassis, and attach it with the three screws ③.
2. Insert the FFC ① into the capstan D.D. motor control PWB ②.

Notes:

1. After installing the capstan D.D. motor, be sure to rotate the capstan motor and check the movement.
2. Check and adjust the servo circuit.

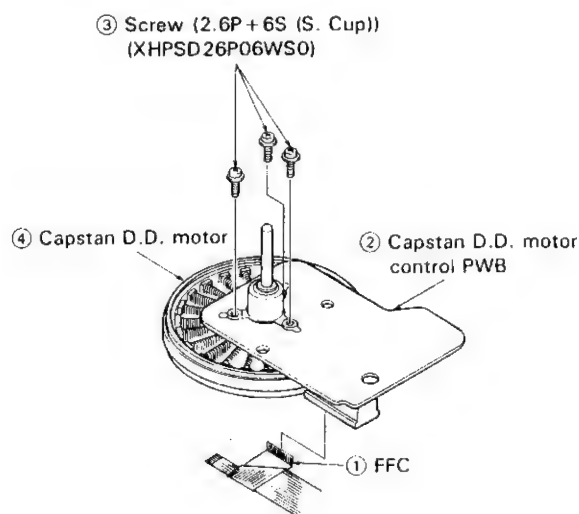


Figure 1-30.

REMOVAL AND REASSEMBLY OF THE LOADING GEAR BLOCK

● Removal

1. Remove the slow brake spring ① and slow brake lever ②.
2. Take out the E ring (A) first and then the loading relay gear ③.
3. Rotate the take-up loading gear ④, take-up loading arm assembly ⑤, supply loading gear ⑥ and supply loading arm assembly ⑦ slightly in the loading direction, and take them all out.
4. Finally remove the E ring (B) and relay gear drive lever ⑧.

● Reassembly

1. Take the reverse steps of the removal.
2. In reassembling, match the tally marks on the gears, as shown in Fig. 1-31

Note:

1. When reassembling, apply grease to the following points; all the gear teeth, all the gear shafts, and the cam groove of loading relay gear which the relay gear drive lever pin comes in.
2. Be careful not to deform the supply/take-up loading arms.
3. Be careful not to stain the felt of the slow brake.
4. Be also careful to keep the outer surface of the capstan D.D. motor ⑨ free from dust and dirt. (If stained, the MR (Magnet Resistor) element ⑩ might be damaged.)
5. Reshape the anti-fall hooks of the slow brake, supply/take-up loading gears as required. Avoid reshaping too much.

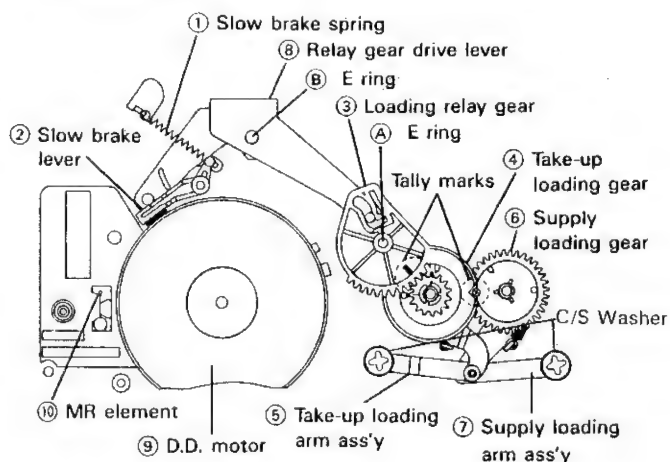


Figure 1-31.

REMOVAL AND REASSEMBLY OF LOADING BLOCK

● Removal

1. Remove the leads and the cassette loading belt from the loading block.
2. Unscrew the three screws ③, and pull up and remove the loading block.

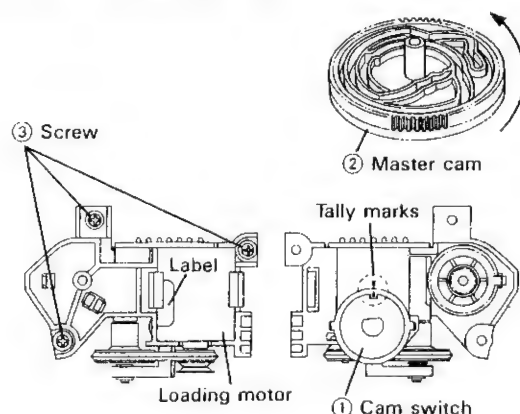


Figure 1-32.

● Reassembly

1. Turn the master cam ② all the way counter-clockwise.
2. Match the tally mark on the cam switch ① with the mating mark. Fit the loading block and the master cam with each other. Tighten up the three screws.
3. Finally connect the leads and apply the cassette loading belt.

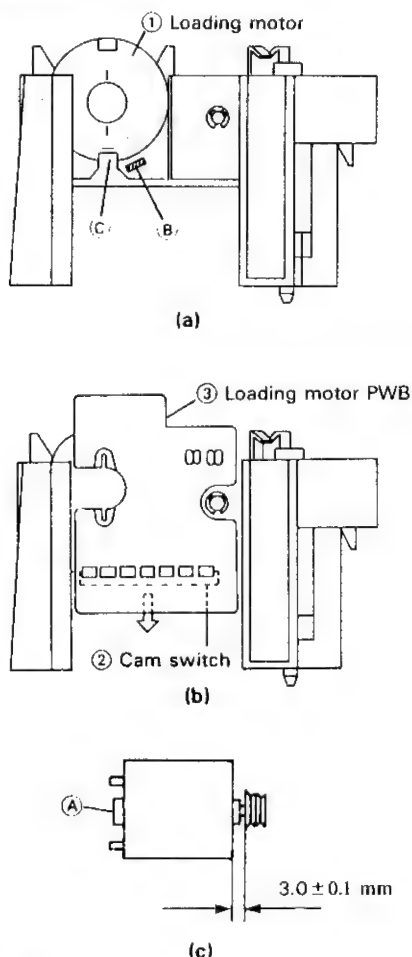
Notes:

1. Be careful not to scratch the gear.
2. Be careful not to stain the belt. If dirty, clean it up.

REPLACEMENT OF LOADING MOTOR

● Removal

1. Remove the loading block.
2. Undo the loading belt.
3. Unsolder the leads from the loading motor ①.
4. Unlock the left and right catches of the cam switch ② off the loading block. Take out the loading block PWB ③.



Note:

1. Press-fit the loading motor pulley to the dimension specified in Fig. 1-33(c).
2. Keep the pressure on the part ① (see above) less than 5 kg.

5. Put the tip of a bladed screwdriver or the like into the opening ⑥ shown in Fig. 1-33 (a). Pry up the back end of the loading motor ① and take out the motor.

● Reassembly

1. Place the loading motor so that its label is visible as shown in Fig. 1-32.

Note:

Make sure that the screw hole at the motor shaft and the protuberance on the loading block are properly engaged and that the notch at the loading motor end and the part ① of the loading block are also fitted together.

2. Set up the loading block PWB ③ and the cam switch ② in position.
3. Resolder the leads to the loading motor.
4. Finally place the loading block in position.

REPLACEMENT OF MASTER CAM

● Removal

1. Remove the loading block.
2. Remove the E ring ① and then the half-loading reciprocating lever ①.

Note:

There is no need to take out the half-loading drive lever.

3. Remove the E ring ② first and then the pinch roller lever ②.
4. Finally pull out the master cam ③ upward.

● Reassembly

1. Place the relay gear drive lever in the unloading state as shown in Fig. 1-31.
2. Set the relay shifter lever ④ to the main chassis; the shifter lever should be adjusted to the reverse guide spring hole in the main chassis. Then place the master cam so that the cut-off part of the boss ① should face the direction of arrow ⇒ ⑤.
3. Place the half-loading reciprocating lever ① so that its cam follower comes in the outermost cam groove. Now attach the E ring ①.

Note:

Preferably hook the half-loading reciprocating spring ⑤ before attaching the lever. It is easier to set up.

4. Turn the master cam ③ somewhat clockwise until the pinch roller lever's cam follower comes into the master cam's groove ①. Then attach the E ring ②.
5. Rotate the master cam ③ by hand to make sure all the four levers (relay gear drive lever, relay shifter lever, half-loading reciprocating lever and pinch roller lever) are right in the cam grooves.
6. Finally set up the loading block.

Figure 1-33.

Notes:

1. Be careful not to scratch the teeth and grooves of the master cam.
2. Before placing the loading block, be sure to rotate the master cam by hand to make sure the levers are right in their respective positions. Otherwise the master cam and the levers might get damaged when the motor starts.
3. Apply grease to the master cam's grooves and teeth.

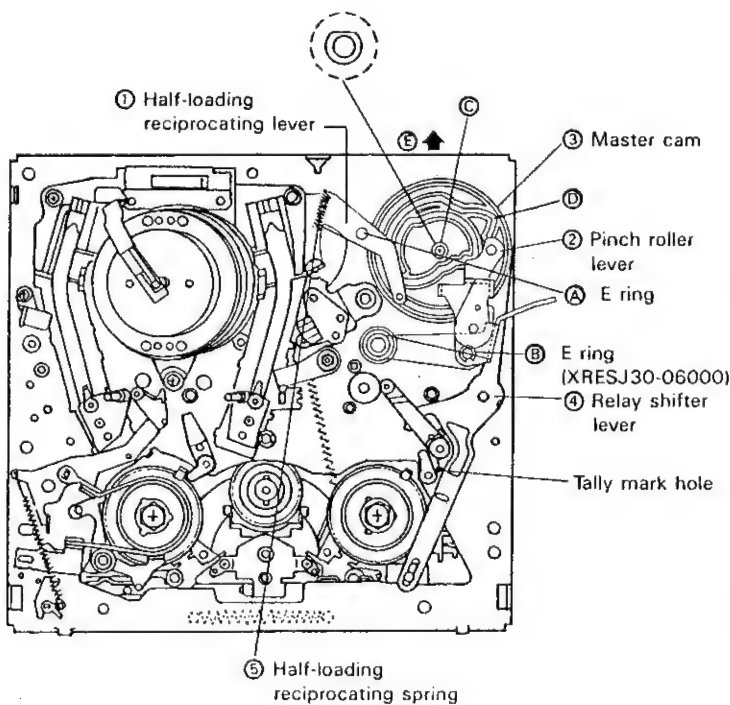


Figure 1-34.

HOW TO UNLOAD THE CASSETTE MANUALLY

1. To unload the cassette the common way.

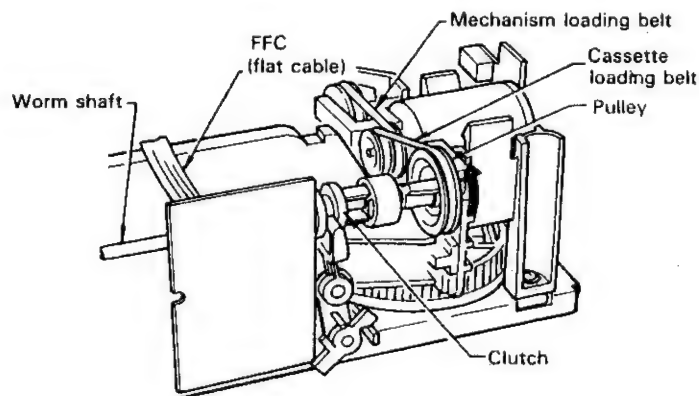


Figure 1-35.

- (1) Turn the pulley in the direction of arrow. (By this, the clutch becomes engaged to eject the cassette.)

Notes:

- Do not touch the worm shaft. Just turn the pulley, and the worm shaft will rotate together.
- Carefully turn the pulley if the unit is equipped with the half-loading lever. Otherwise the cassette tape may get loose.

- (2) To unload the cassette by activating the cassette housing control.

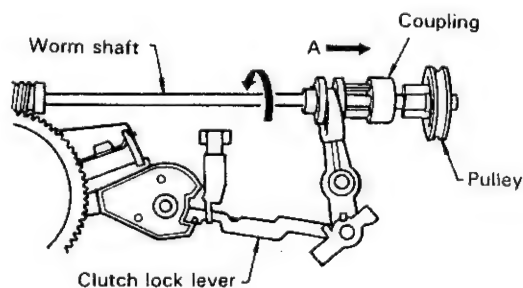


Figure 1-36.

- (1) Remove the cassette loading belt.
- (2) Turn the coupling in the direction of arrow until the cassette comes up.
- (3) Press the clutch in the direction A to get the clutch engaged.
- (4) Now turn the worm shaft all the way in the direction of arrow to take out the cassette.

Notes:

- Carefully turn the worm shaft if the unit is equipped with the half-loading lever. Otherwise the cassette tape may become loose.
- If the second method (activating the cassette housing control) is carried out, the cassette housing control and the mechanism come out of phase from each other. Take the following steps to get in phase with the cassette housing control.
 - (1) Remove the cassette loading belt and the flat cable.
 - (2) Turn the power on. The mechanism will automatically be in the eject mode and get in phase with the cassette housing control.
 - (3) Unplug the power cord.
 - (4) Make sure the cassette housing stays in the eject mode. Apply the cassette loading belt and connect the flat cable.
 - (5) Plug in the power cord. Finally load the cassette and eject it to make sure the motion is perfect. (This loading and ejection makes for proper phasing.)
- If the tape has not been fully rewound, remove the bottom panel of the unit and turn the capstan D.D. motor rotor or the reel pulley in the direction of arrow B to wind up the tape. Now you can take out the cassette without damaging the tape.
- Before taking the above measure, be sure to unplug the power cord.

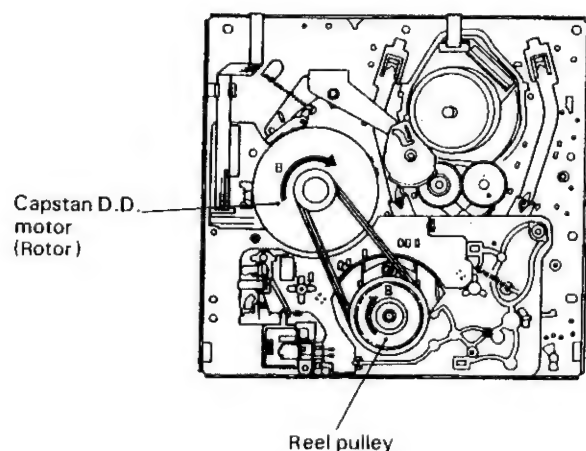


Figure 1-37.

[illegible]

PARTS LIST

PARTS REPLACEMENT

Many electrical and mechanical parts in video cassette recorder have special safety-related characteristics.

These characteristics are often not evident from visual inspection nor can be protection afforded by them necessarily obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have special safety characteristics are identified in this manual, electrical components having such features are identified by Δ and shaded areas in the Replacement Parts Lists and Schematic Diagrams.

The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION
5. CODE

PWB ASSEMBLY IS NOT REPLACEMENT ITEM

REF. NO.	PART NO.	DESCRIPTION	CODE
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MAIN (SERVO, SYSTEM-CONTROL, IF) CIRCUIT

	DUNTK2946TM64	Main (Servo, System-Control, IF) Board Assembly	—
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TRANSISTORS

Q702, 703, 801, 802, 803, 957	VS2SC2412KQ- 1	2SC2412KQ	AA
Q704, 706	VSDTC124EK/ - 1	DTC124EK	AB
Q705, 708, 709, 4401, 5901, 8809	VS2SA1037KQ- 1	2SA1037KQ	AA
Q707	VSDTA124EK/ - 1	DTA125EK	AB
Q710, 711	VSDTC114EK/ - 1	DTC114EK	AB
Q804	VS2SC2001LK-1	2SC2001LK	AA
Q951	VS2SA988/ / / 1E	2SA988	AB
Q952	VS2SA1013/ / / 1E	2SA1013	AD
Q953, 955	VS2SB1117KU1E	2SB1117KU	AE
Q954, 956, 2201, 5902, 5903,	VSDTC144EK/ - 1	DTC144EK	AB

REF. NO.	PART NO.	DESCRIPTION	CODE
6601, 6606, 8808, 8810			
Q1451	VS2SC383- WT- 1	2SC383-WT	AE
Q1454	VS2SA933SQR1E	2SA933SQR	AB
Q6602, 6603, 6605	VS2SD1757KS- 1	2SD1757KS	AC
Q6604, 8807	VSDTA144EK/ - 1	DTA144EK	AC
Q8801, 8805	VS2SA950- Y/ 1E	2SA950-Y	AD
Q8802	VSDTA114EK/ - 1	DTA114EK	AB

INTEGRATED CIRCUITS

IC701	RH- i X0431GEZZ		AS
IC702	VHi BA15218N- 1		AD
IC801	RH- i X0491GEZZ		AV
IC802	RH- i X0371GEZZ		AL
IC803	VHi BA6209/ / 1E		AG
IC804	VHi PST529H2- 1		AD
IC951	VHi UPC574JT- 1		AC
IC1451	VHi UPC1484CA1		AM
IC2201	VHi BA7021/ / - 1		AE
IC5901	VHi BU2762L/ - 1		AN

DIODES AND CRYSTAL

D701, 702, 704, 708 712, 801 804, 956, 957, 5901, 5902, 6602, 8802, 8803	RH- DX0048GEZZ		AA
D707	RH- EX0343GEZZ	HZS2SC3	AB
D805, 954	RH- DX0052GEZZ		AB
D952	RH- EX0141GEZZ	HZS6.2EB3	AB
D953	RH- EX0152GEZZ	HZS9.1EB2	AA
D955	RH- EX0198GEZZ	HZS33EB3	AB
D959	RH- EX0010GEZZ	RD5.6EB2	AB
D2201, 2202, 4401, 4402	RH- EX0168GEZZ	HZS15EB2	AA
D6601	VHD1S2835/ / 1E		AC
D8801	RH- EX0217CEZZ	RD15EB1	AB
X5901	RCRSB0086GEZZ	Crystal	AG

CONTROLS

R736, 740	RVR- M4343GEZZ	100k(B) Slow/Still Tracking Adj. 100k(B) Playback Phase Generator MM Adj.	AB
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REF. NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
R828	RVR- B4336GEZZ	100k(B) False Vertical Sync. Adj.	AD	TRANSISTORS			
R1464	RVR- M4306GEZZ	4.7k(B) Osc. Adj.	AC	Q201, 205	VSDTC144EK/ - 1	DTC144EK	AB
COILS AND FILTER				Q202	VSDTC144ES/ - 1	DTC144ES	AB
L1451	VP- XF120K0000	12 μ H	AB	Q203	VS2SA1037KQ- 1	2SA1037KQ	AA
L4401	VP- MK221K0000	220 μ H	AB	Q501	VS2SC2001LK- 1	2SC2001LK	AA
FL801	PFI LA0030CEZZ	Filter	AD	Q502, 503, 504, 505, 3302	VS2SC2412KQ- 1	2SC2412KQ	AA
CAPACITORS				Q507	VS2SA933SOR1E	2SA933SOR	AB
C702, 712, 814, 2201	VCE9EA1HW105M	1 μ F, 50V, 20%, Electrolytic (N.P.)	AC	Q3301	VS2C1740SOR1E	2C1740SOR	AC
C715	VCE9EA1HW225M	2.2 μ F, 50V, 20%, Electrolytic (N.P.)	AB	INTEGRATED CITCUITS			
C719, 728	VCEAGAOJW107M	100 μ F, 6.3V, 20%, Electrolytic	AB	IC201	VHi AN3215NK- 1		AP
C732, 738	RC- KZ0011GEZZ	0.1 μ F, Ceramic	AA	IC401	VHi AN3320K/ - 1		AQ
C733	VCE9EA1CW106M	10 μ F, 16V, 20%, Electrolytic (N.P.)	AC	IC501	VHi TA8644N/ - 1		AP
C736	VCE9EA1HW475M	4.7 μ F, 50V, 20%, Electrolytic (N.P.)	AD	DIODES AND CRYSTAL			
C743	RC- EZ0123GEZZ	47 μ F, 10V, Electrolytic	AB	D201, 202, 203, 204, 502, 503, 504	RH- DX0048GEZZ	1N4531	AA
C1460	VCQPKA2AA682J	6800pF, 100V, 5%, Polypro Film	AB	D205	RH- EX0049GEZZ	MTZ5.1A	AB
C1564, 4401	VCEAEA1CW107M	100 μ F, 16V, 20%, Electrolytic	AC	D501	RH- EX0374GEZZ	HZS6A3/TA	AA
C4403	VCEADA0JW477M	470 μ F, 6.3V, 20%, Electrolytic	AB	X501	RCRSB0002CEZZ	Crystal	AM
C5526	VCEAEA0JW107M	100 μ F, 6.3V, 20%, Electrolytic	AB	CONTROLS			
C8801	VCEAGA1AW227M	220 μ F, 10V, 20%, Electrolytic	AB	R201, 224, 225, 414	RVR- M4419GEZZ	47k(B) EE Level Adj. 47k(B) Dark Clip Adj. 47k(B) White Clip Adj. 47k(B) Playback Level Adj.	AB
MISCELLANEOUS				R220	RVR- M4415GEZZ	10k(B) Deviation Adj.	AB
ALM801	RUNTK0505GEZZ	Audio unit	AW	R222	RVR- M4417GEZZ	10k(B) FM Carrier Adj.	AB
	Ri FU- 0516GEZZ	IF Pack	AY	R506	RVR- M4380GEZZ	100k(B) APC	AC
	VTUATEMB1- 015	Tuner	AZ	R518	RVR- M4432GEZZ	2.2k(B) Record Chroma Level Adj.	AB
	RCNVR0013GEZZ	RF Converter	BA	R3304	RVR- M4430GEZZ	1k(B) Record FM Level Adj.	AB
	RALMB0010GEZZ	Alarm	AD	COILS AND FILTERS			
	QPLGN0228TAZZ	Plug, 2 pin (TP2201)	AB	L201, 3304	VP- DF221K0000	220 μ H	AB
	QPLGN0328TAZZ	Plug, 3 pin (TP1451, AC)	AD	L401, 404, 3302	VP- XF680K0000	68 μ H	AB
	QPLGN0428TAZZ	Plug, 4 pin (TP701-704)	AB	L402	VP- XF121K0000	120 μ H	AB
	QPLGN0528TAZZ	Plug, 5 pin (*, AB)	AB	L403	VP- XF101K0000	100 μ H	AB
	QPLGN0679GEZZ	Plug, 6 pin (AX, AY)	AB	L405	VP- XF150K0000	15 μ H	AB
	QPLGN1079GEZZ	Plug, 10 pin (AW, AV)	AB	L501	VP- XF180K0000	18 μ H	AB
	QSöCN1022REZZ	Socket, 10 pin (AP)	AC	L502	VP- XF390K0000	39 μ H	AB
	QSöCN1294GEZZ	Socket, 12 pin (AS, AT)	AC	L503, 504	VP- XF221K0000	220 μ H	AB
	QSöCN2794GEZZ	Socket, 27 pin (AM)	AD	L505	VP- MK561K0000	560 μ H	AB
	QSöCZ2120GEZZ	Socket, 21 pin	AE	L3301, 3303	VP- XF151K0000	150 μ H	AB
Y/C CIRCUIT							
	DUNTK2947TM50	Y/C Board Assembly	-				

REF. NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
DL401	RCi LZ0183GEZZ	Delay Line	AK	TRIMMER			
DL501	RCi LZ0191GEZZ	Delay Line	AM	C5002	RT6-H1005AEZZ	Trimmer	AC
FL201	RMP TD0254GEZZ	Filter	AG	CAPACITOR			
FL501	RMP TD0239GEZZ	Filter	AG	C5014	RC-EZ0127GEZZ	0.018F, Electrolytic	AF
FL502	RMP TD0256GEZZ	Filter	AF	FILTER			
CAPACITORS				FL5001	RFi LC0090GEZZ		AD
C203	VCE9EA1HW335M	3.3 μ F, 50V, 20% Electrolytic (N.P.)	AB	MISCELLANEOUS			
C225	VCEAGA1AW227M	220 μ F, 10V, 20% Electrolytic	AB	DG5001	VVK12BT22GK-1 RRMCU0037GEZZ QPLGN0428TAZZ	Timer/Mode Display Remote Control Receiver Plug, 4 pin (TP1501-1504)	AX AL AB
C420	VCEAGA0JW108M	1000 μ F, 6.3V, 20% Electrolytic	AC	SW5001, 5002, 5003, 5004, 5005, 5006, 5007, 5009, 5010, 5011, 5013	QSW- K0052GEZZ	Socket, 12 pin (TA, TB) Switch, Channel-Up Switch, Channel-Down Switch, Tracking (+) Switch, Tracking (-) Switch, Power Switch, Eject Switch, Pause Switch, Stop Switch, Playback Switch, Record Switch, ACL	AC AB
C504	RC-QZA392TAYJ	3900pF, Mylar	AB	SW5014	QSW-S0194GEZZ	Switch, VHF/UHF	AC
C506	RC-QZA222TAYJ	2200pF, Mylar	AB	SW5016	QSW-S0193GEZZ	Switch, Full Auto	AC
C508	RC-KZ0011GEZZ	0.1 μ F, Ceramic	AA	SW5015	QSW-S0104GEZZ	Switch, Mute On/Off	AD
MISCELLANEOUS				HEAD AMP CIRCUIT			
	OPLGN0329TAZZ	Plug, 3 pin (CF)	AB		DUNTK2948TM51	Head Amp Board Assembly	—
	OPLGN0878GEZZ	Plug, 8 pin (CE)	AC	TRANSISTORS			
	QSDCN0679GEZZ	Socket, 6 pin (CC, CD)	AC	Q301	VS2SC2059KN1E	2SC2059K	AC
	QSDCN1079GEZZ	Socket, 10 pin (CA, CB)	AC	Q302	VS2SC2412KQ-1	2SC2412	AA
TIMER CIRCUIT				INTEGRATED CIRCUIT			
	DUNTK2954HE54	Timer Board Assembly	—	IC301	VHi BA7252S/-1		AH
TRANSISTORS				COILS			
Q5001, 5004	VS2SA1561Q/1E	2SA1561	AC	L303	VP-DF101K0000	100 μ H	AB
Q5002	VSDTC124ELT-1	DTC124ELT	AA	L304	VP-XF680K0000	68 μ H	AB
Q5003	VSDTC144ELT-1	DTC144ELT	AB	L305, 306	VP-XF330K0000	33 μ H	AB
INTEGRATED CIRCUITS				L307	VP-XF220K0000	22 μ H	AB
IC5001	RH-iX0455GEZZ		AX	L309	VP-XF151K0000	150 μ H	AB
IC5002	VHi MSM16905-1		AL	CONTROL			
DIODES AND CRYSTAL				R5017	RVR-B4293GEZZ	20k(B) Picture Tone Adj.	AC
D5001	RH-DX0048GEZZ		AA				
5007, 5010, 5013, 5019							
5021							
D5023	RH-PX0139GEZZ	LED	AB				
X5001	RCSR80059GEZZ	Crystal	AD				

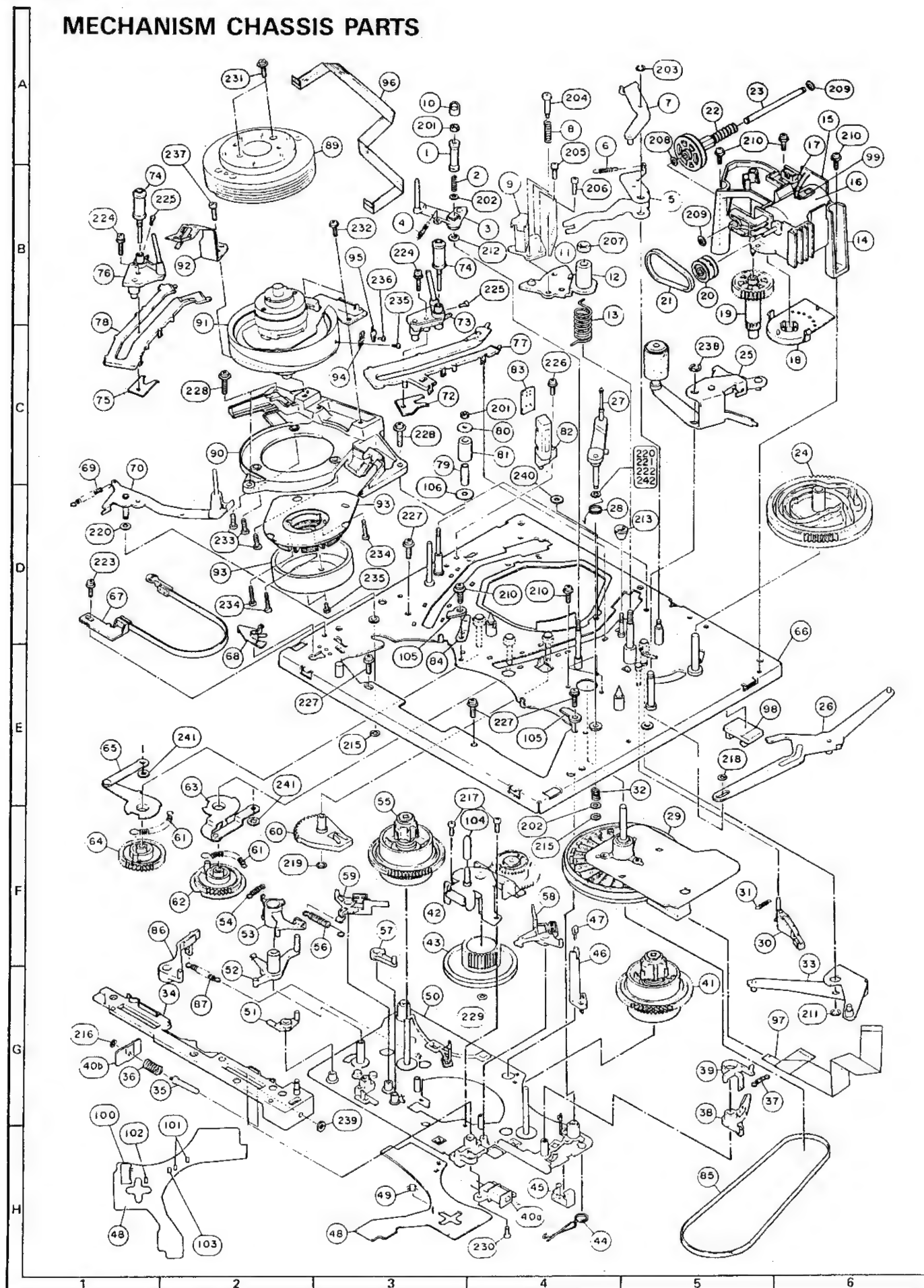
REF. NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
MISCELLANEOUS				TRANSISTOR			
FB301, 302	QPLGN0229TAZZ	Plug, 2 pin (TP301, 302)	AB	Q901	95KUAD0088AZ	2SD1565	AF
	QPLGN0880GEZZ	Plug, 8 pin (XA)	AC	INTEGRATED CIRCUIT			
	QS6CN0532REZZ	Socket, 5 pin (ZA)	AB	IC901	95KUCB0029AZ	PQ09R05	AK
	RBLN- 0013GEZZ	Ferrite Bead	AB	DIODES			
AUDIO CIRCUIT				DIODES			
	RUNTK0505GEZZ	Audio Board Assembly	AW	ΔD901, Δ 902, Δ 903, Δ 904, Δ 908, Δ 909, Δ 910, Δ 911	95KUBC0112AZ	11E1	AB
TRANSISTOR				D905	95KUBA0005AZ	1SS55	AB
Q602	VS2SC3939R1- 1 or VS2SC1509R/ - 1	2SC3939R 2SC1509	AD AD	D906	95KUBD0439CZ	RD12ESB2	AB
INTEGRATED CIRCUIT				D907	95KUBD0455CZ	RD2.0ESB2	AB
IC601	VHi BA7765SX- 1 or VHi BA7765AS/ /	BA7765AS	AL AM	ΔD912	95KUBC0125BZ	ERA15-02	AB
CONTROL				TRANSFORMER			
R610 R630	RVR- B5446CEZZ RVR- B5453CEZZ	10k(B) Playback Level Adj. 470k(B) Bias Adj.	AB AB	ΔT901	95K116035002	PT2493	BE
COILS AND TRANSFORMER				CAPACITORS			
L601	VP- YF822J0000 or VP- ZF822J0000	8.2mH 8.2mH	AC AC	C902, 905	95KUGZ0654ZZ	2200μF, 35V, Electrolytic	AG
L602 T601	VP- ZK221K0000 RTRNH0053GEZZ	220μH	AB AE	C906	95KUGAJ470BU	47μF, 100V, Electrolytic	AD
CAPACITORS				RESISTORS			
C610	VCEAAA1AW107M	100μF, 10V, 20%, Electrolytic	AB	ΔR901	95KUEZ0085ZZ	12M ohm, 1/2W, Solid	AE
C627	VCE9EA1HW105M	1μF, 50V, 20%, Electrolytic (N.P.)	AB	ΔR904	95KUEBBR22AG	0.22 ohm, Fusible Resistor	AC
C623	VCQPSA2HA562J	0.0056μF, 500V, Polypro Film	AB	ΔR905	95KUES2202AA	22k ohm, 1/4W, Carbon	AA
MISCELLANEOUS				ΔR906	95KUES2201AA	2.2k ohm, 1/4W, Carbon	AA
	QPLGN0229TAZZ	Plug, 2 pin (TP601, 602)	AB	ΔPR901	95KUEZ0389ZZ	6.8 ohm, Thermistor	AE
	QPLGZ0725GEZZ	Plug, 7 pin (K601, 602)	AC	MISCELLANEOUS			
POWER CIRCUIT				Δ	QACCB9013GEZZ	AC Cord, AC240V/50Hz	AL
	RDENT0318GEZZ	Power Board Assembly	—	ΔF901	95KPJC0472ZZ or 95KPJC0376ZZ	Fuse, T1A, 250V	AD
				Δ	95KPJC0376ZZ	Fuse, T1A, 250V	AF
				ΔF902	95KPJC0473ZZ or 95KPJC0237ZZ	Fuse, T2A, 250V	AD
				Δ	95KPJC0237ZZ	Fuse, T2A, 250V	AE
				OA	95KPKZ0194ZZ	Plug, 3 pin (OA)	AC
POWER CIRCUIT				INFRARED REMOTE CONTROL CIRCUIT			
					RRMCG0488GESA	Infrared Remote Control Unit	BU

REF. NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
TRANSISTORS				CABINET PARTS			
Q3001, 3003	VS2SC1815Y/ 1E	2SC1815Y	AB		GCABA0216AASA	Upper Cabinet	AN
Q3002	VS2SC2120Y/ - A	2SC2120Y	AC		GCABB0206AASA	Bottom Cabinet	AH
Q3004	VS2SA950- Y/ - 1	2SA950Y	AC		GC6VH0086PASA	Battery Cover	AC
Q3005, 3006	VS2SA1015- Y- A	2SA1015Y	AC		RFi LW0129PASA	Filter	AD
					GD6RF0017PASA	Door	AK
					GC6VA0100PASA	Door Cover	AE
					MSPRP0535PASA	Rubber Key A (Prog.)	AK
					MSPRP0536PASA	Rubber Key B (Slow)	AH
					MSPRP0537PASA	Rubber Key C (Rec.)	AM
					JBTN- 0804PASB	Button	AB
					HPNLH0612PASA	Indication Plate A (LCD)	AE
					HPNLH0621PASA	Indication Plate B (Operation)	AE
					MSPRC0069PAZZ	Spring	AA
					GLEGP0027PAZZ	Rubber Pad	AA
					QTANZ0216PAZZ	Battery Terminal (+, -) A (2 pcs)	AB
					QTANZ0230PAZZ	Battery Terminal (+, -) B (1 pc)	AB
					XYBSD20P06000	Screw	AA
					XYBSF20P08000	Screw	AA
					PCUSS0030PAZZ	Cushion	AA
					PSHEF0042PAZZ	Spacer	AA
INTEGRATED CIRCUITS				THE OTHER PARTS			
I3001	RH- i X0890PAZZ		AX		QCNW- 2702GEZZ	Connecting Cord	AL
I3002	RH- i X0895PAZZ		AT		TGAN- 1024CEZZ	Guarantee Card	AB
I3003	RH- i X0896PAZZ		AT		Ti NS- 1194GEZZ	Operation Manual	AG
I3004	RH- i X0897PAZZ		AT				
I3005	RH- i X0867PAZZ		AF				
I3006	RH- i X0884PAZZ		AF				
DIODES AND CRYSTALS				MECHANISM CHASSIS PARTS			
D3001, 3002	RH- PX0142PAZZ	LED	AC	1	PGi DS0023GEFW	Retaining Guide	AE
D3003 3008	VHD1SS270/ / - 1	1SS270	AA	2	MSPRC0142GEFJ	Retaining Guide Spring	AA
X3001	RCRSA0043PAZZ	32.768kHz	AE	3	MLEVC0022GEZZ	Half-Loading Lever	AF
CF3001	RFi LF0063PAZZ	2.43MHz	AE	4	MSPRT0270GEFJ	Half-Loading Lever Spring	AA
CF3002	RFi LF0029PAZZ	400kHz	AD	5	MLEVF0284GEFW	Half-Loading Drive Lever	AC
				6	MSPRT0269GEFJ	Half-Loading Reciprocating Spring	AA
CONTROL				7	MLEVF0283GEZZ	Half-Loading Reciprocating Lever	AB
VR3001	RVR- B0053PAZZ	50k(B)	AE	8	MSPRC0144GEFJ	Azimuth Spring	AA
CAPACITORS				9	RHEDU0070GEZZ	Audio/Control Head Ass'y	AS
C3001, 3002	RC- EZi 107AF1C	100μF, 16V, Electrolytic	AB	10	PCAPS1015GEZZ	Retaining Guide Cap	AA
C3003	RC- EZ 106AF1C	10μF, 16V, Electrolytic	AB	11	QPWBF2888GEZZ	Audio/Control Head PWB	AB
C3008	RC- QZA683LA1H	0.068μF, Mylar	AB	12	MLEVF0292GEZZ	Audio/Control Head Arm	AD
C3011 3014	RC- CZ0303PAZZ	0.1μF, Ceramic	AB	13	MSPRD0087GEFJ	Audio/Control Head Arm Spring	AA
C3015, 3018	RC- EZH336AF0J	33μF, 6.3V, Electrolytic	AA	14	LHLDZ1606GEZZ	Loading Block Holder Ass'y	AC
C3016	RC- EZH226AF0J	22μF, 6.3V, Electrolytic	AB	15	QPRBF2886GEZZ	Loading Block PWB	AD
C3017	RC- EZH107AF0J	100μF, 6.3V, Electrolytic	AB	16	RM6TM1049GEZZ	Loading Motor	AM
C3019	RC- QZA104LA1H	0.1μF, Mylar	AB	17	QPLGN0529TAZZ	Plug, 5 Pin (MG)	AB
C3020	RC- QZA223LA1H	0.0022μF, Mylar	AA	18	QSW- R0023GEZZ	Cam Switch	AF
C3021	RC- QZA472LA1H	4700pF, Mylar	AB	19	NGERW1032GEZZ	Worm Wheel	AC
C3022	RC- QZA562LA1H	5600pF, Mylar	AA	20	NPLYV0133GEZZ	Loading Motor Pulley	AC
MISCELLANEOUS				21	NBL TK0058GE00	Loading Belt	AA
LCD3001	DUNTL0036PAZZ	LCD	AU	22	NGERW1031GEZZ	Worm Ass'y	AC
SP3001	VSP0040P- 157B	Spaker Terminal	AQ	23	NSFTG0045GEFJ	Worm Shaft	AB
	LHLDZ0057PAZZ	LCD Holder	AC	24	NGERH1118GEZZ	Master Cam	AC
	QTANZ0228PAZZ	Battery Terminal (+)	AA	25	MLEVF0281GEZZ	Pinch Roller Lever Ass'y	AN
	QTANZ0229PAZZ	Battery Terminal (-)	AA				
SW3001	QSW- P0073PAZZ	Switch	AD				
SW3002	QSW- P0075PAZZ	Switch	AB				

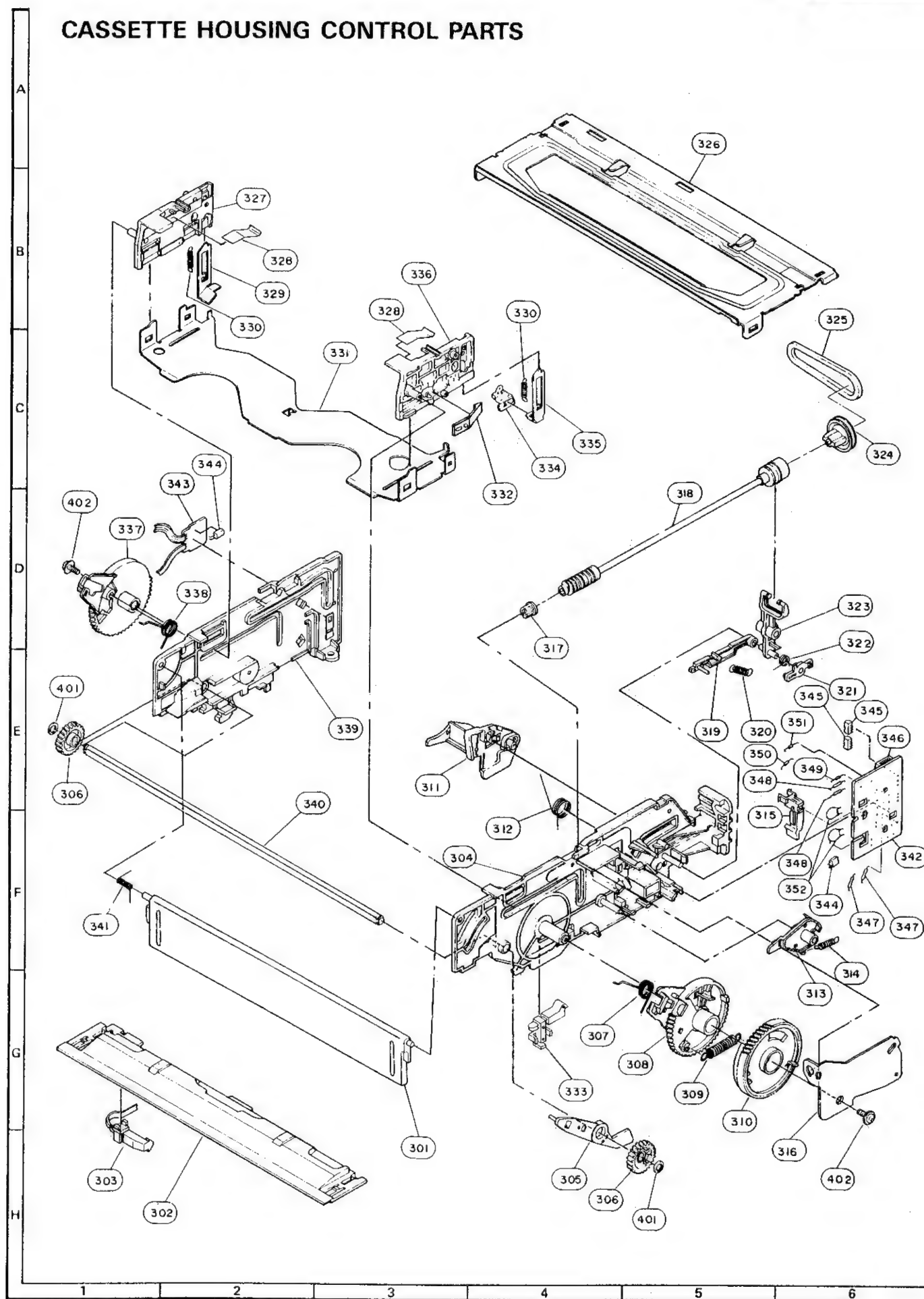
REF. NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
26	MLEVF0290GEZZ	Relay Shifter Lever	AE	87	MSPRT0282GEFJ	Auxiliary Fast-Forward Brake Spring	AB
27	MLEVC0023GEZZ	Reverse Guide	AG	89	DDRMU0002HE17	Upper Drum Ass'y	BH
28	MSPRD0086GEFJ	Reverse Guide Spring	AA	90	PGi DC0039GEFW	Drum Base	AL
29	RMōTN2019GEZZ	Capstan D.D. Motor	AZ	91	DDRML0012HE01	Lower Drum Ass'y	BB
30	MLEVP0136GEZZ	Slow Brake Lever	AA	92	QBRSK0021GEZZ	Earth Brush Ass'y	AC
31	MSPRT0276GEFJ	Slow Brake Spring	AA	93	RMōTP1096GEZZ	Drum D.D. Motor Ass'y	AW
32	MSPRC0151GEFJ	Reverse Guide Spring	AA	94	LANGT9105GEFW	Heater Angle	AC
33	MLEVF0289GEZZ	Relay Gear Drive Lever	AE	95	VHi M5F7805L-1	3-terminal Regulator	AE
34	MSLi F0043GEZZ	Brake Shifter	AK	96	QCNW-4880GEZZ	Full Flat Cable (Drum D.D. Motor)	AN
35	NSFTZ0068GEFD	Brake Lock Shaft	AC	97	QCNW-5313GEZZ	Full Flat Cable (Capstan D.D. Motor)	AN
36	MSPRC0143GEFJ	Absorber Plate Spring	AB	98	LHLDW1109GEZZ	Full Flat Cable Holder	AB
37	MSPRT0274GEFJ	Video Search Spring	AB	99	RDTCH0018GEZZ	Dew Sensor	AG
38	MLEVP0130GEZZ	Video Search Brake Lever	AD	100	QScCN0534REZZ	Socket, 5 pin (MF)	AC
39	MLEVP0131GEZZ	Video Search Reciprocating Lever	AC	101	VRS-TW2ED221J	220 ohm, 1/4W, 5%, Oxide Film	AA
40	RPLU-0083GEZZ	Brake Solenoid Ass'y	AF	102	VCKYTV1HB102K	.001μF, 50V, 10%, Disc	AA
41	NDai V1046GEZZ	Take-up Reel Disk Ass'y	AG	103	VRS-TV1JD473J	47k ohm, 1/16W, 5%, Oxide Film	AA
42	NGERH1122GEZZ	Idler Gear Ass'y	AN	104	PCAPS8001GEZZ	Release Pin Cap	AA
43	NPLYV0134GEZZ	Reel Pulley	AC	105	LANGA0051GEFW	Take-Up Reel Disk Catch Holder	AB
44	MSPRD0085GEFJ	Shifter Spring	AB	106	PGi DH0036GEFW	Supply Impedance Roller Flange (Low)	AA
45	PCōVP1018GEZZ	Shifter Spring Cover	AC	CASSETTE HOUSING CONTROL PARTS			
46	LHLDP1092GEZZ	Cassette LED Holder	AE		CHLDX3046GE00	Cassette Housing Control Assembly (Excludes the Cassette Cover)	AY
47	RH-PX0169GEZZ	Cassette LED	AD				
48	QPWBF2977GEZZ	Reel Sensor PWB	AK				
49	RH-PX0171GEZZ	Reel Sensor	AE				
50	LCHSS0016GEZZ	Reel Block Chassis	AL				
51	MLEVP0134GEZZ	Tension Adjusting Lever	AC				
52	MLEVP0133GEZZ	Tension Release Lever	AC				
53	MLEVP0132GEZZ	Back Tension Lever	AC				
54	MSPRT0273GEFJ	Spring, Fast Forward	AB				
55	NDai V1047GEZZ	Supply Reel Disk Ass'y	AH				
56	MSPRT0272GEFJ	Main Brake Spring	AC				
57	MLEVP0135GEZZ	Intermediate Lever	AC				
58	MLEVP0129GEZZ	Main Take-up Brake Lever	AE				
59	MLEVP0128GEZZ	Main Supply Brake Lever	AE				
60	NGERH1121GEZZ	Loading Relay Gear	AA	301	HDECQ0546GESA	Cassette Cover	AF
61	MSPRT0271GEFJ	Loading Reciprocating Spring	AA	302	PGi DM0069GE00	Down Guide	AC
62	NGERH1120GEZZ	Take-up Loading Gear	AA	303	QSW-F0034GEZZ	Cassette Erase Protection Switch	AC
63	MLEVF0286GEZZ	Take-up Loading Arm Ass'y	AC	304	LHLDX1008GE00	Cassette Housing Frame (Right)	AF
64	NGERH1119GEZZ	Supply Loading Gear	AA	305	MARMP0038GE00	Cassette Cover Arm	AA
65	MLEVF0285GEZZ	Supply Loading Arm Ass'y	AC	306	NGERW1036GEZZ	Phase Gear	AA
66	LCHSM0091GEZZ	Main Chassis Ass'y	AR	307	MSPRD0088GEFJ	Drive Gear Spring (Right)	AA
67	LBNDK1002GEZZ	Tension Band Ass'y	AD	308	NGERW1034GEZZ	Drive Gear (Right)	AB
68	LHLDZ1607GEZZ	Tension Spring Hook Plate	AA	309	MSPRT0277GEFJ	Reciprocating Spring	AA
69	MSPRT0275GEFJ	Tension Spring	AA	310	NGERW1033GEZZ	Worm Wheel Gear	AB
70	MLEVF0291GEZZ	Tension Arm Ass'y	AF	311	MLEVP0142GE00	Open Lever	AA
72	MSLi F0042GEFW	Take-up Pole Base Slider	AB	312	MSPRD0091GEFJ	Open Lever Spring	AA
73	LPōLM0033GEZZ	Take-up Pole Base Ass'y	AG	313	MLEVP0141GEZZ	Switching Lever	AA
74	NRōLP0062GEZZ	Guide Roller Ass'y	AE	314	MSPRT0280GEFJ	Switching Lever Spring	AA
75	MSLi F0041GEFW	Supply Pole Base Slider	AB	315	QSW-F0035GEZZ	Cassette Switch	AD
76	LPōLM0032GEZZ	Supply Pole Base Ass'y	AG	316	LANGF9355GEFW	Worm Bracket	AB
77	PGi DM0066GEZZ	Take-up Loading Rail	AB	317	NBRGP0013GEZZ	Bearing	AA
78	PGi DM0067GEZZ	Supply Loading Rail	AB	318	NSFTD0016GEZZ	Worm Shaft Ass'y	AE
79	NSFTL0563GEFW	Supply Impedance Roller Innor	AC	319	MLEVP0140GEZZ	Clutch Lock Lever	AA
80	PGi DH0031GEFW	Supply Impedance Roller Flange	AA	320	MSPRT0279GEFJ	Clutch Loch Lever Spring	AA
81	NRōLP0056GEZZ	Supply Impedance Roller	AD	321	MLEVP0139GEZZ	Clutch Release Lever	AA
82	RHEDT0026GEZZ	Full Erase Head Ass'y	AK	322	MSPRD0092GEFJ	Clutch Release Lever Spring	AA
83	QPWBF2936GEZZ	Full Erase Head PWB	AA	323	MLEVP0138GEZZ	Clutch Lever	AA
84	MSPRP0114GEFJ	Cassette Control Earth Spring	AA	324	NPLYV0135GEZZ	Pulley	AA
85	NBLTK0059GE00	Reel Belt	AB	325	NBLTK0060GE00	Cassette Loading Belt	AB
86	MLEVP0146GEZZ	Auxiliary Fast Forward Brake Lever	AE	326	LANGF9354GEFW	Upper Plate	AD
				327	LHLDX1013GE00	Slider Holder (Left)	AB
				328	MSPRP0115GEFJ	Cassette Spring	AB
				329	LANGF9357GEFW	Slider Lock (Left)	AA
				330	MSPRT0281GEFJ	Slider Lock Spring	AA

REF. NO.	PART NO.	DESCRIPTION	CODE	REF. NO.	PART NO.	DESCRIPTION	CODE
331	MSLi F0044GEFW	Slider	AF	229	LX- WZ1040GE00	Washer CW2.5-6-0.5	AA
332	MARMP0039GEZZ	Lock Release Lever Ass'y	AA	230	XJBSD20P06000	B Tight Screw 2P+6S	AA
333	QSW- F0037GEZZ	Auto Load Switch	AD	231	LX- BZ3039GEFN	Screw W3P+9S-NI	AA
334	MLEVP0143GE00	Slider Lock Cover	AA	232	LX- HZ3045GEFD	Screw S3P+8S-6W	AA
335	LANGF9356GEFW	Slider Lock (Right)	AA	233	LX- BZ3064GEFN	Screw SW3P+6S-NI	AA
336	LHLDX1012GE00	Slider Holder (Right)	AB	234	XBPSD26P12J00	Screw SW2.6P+12S	AA
337	NGERW1035GEZZ	Drive Gear (Left)	AB	235	XBPSD30P05J00	Screw SW3P+5S	AA
338	MSPRD0089GEFJ	Drive Gear Spring (Left)	AA	236	XBPSD30P06J00	Screw S3P+6S	AA
339	LHLDX1009GE00	Cassette Housing Frame (Left)	AF	237	XHPSD30P08000	Screw S3P+8S	AA
340	NSFTD0015GEFD	Main Shaft	AD	238	LX- RZ3001AEZZ	E-Ring (Curl)	AA
341	MSPRD0090GEFJ	Cassette Cover Spring	AA	239	LX- WZ1042GE00	Washer CW2.7-7-0.5	AA
342	QPWBF3005GEZZ	Start Sensor PWB	AC	240	XWHJZ31- 02054	Washer, W3.1-5.4-0.25	AA
343	QPWBF2894GEZZ	End Sensor PWB	AB	241	LX- RZ3011GEFJ	C/S Washer	AA
344	RH- PX0053GEZZ	Phototransistor	AF	242	XWHJZ25- 04050	Washer W2.6-5-0.4	AA
345	VS2SA937- Q/- 1	Transistor	AC	MECHANICAL PARTS			
346	QS5CN0595GEZZ	Socket, 5 Pin	AB				
347	VRD- RA2EE153J	15k ohm, 1/4W, 5%, Carbon	AA	601	GCABB1079GEZZ	Main Frame	AR
348	VRD- RA2EE223J	22k ohm, 1/4W, 5%, Carbon	AA	602	GCABA3046GES3	Top Cabinet Ass'y	AR
349	VRD- RA2BE332J	3.3k ohm, 1/8W, 5%, Carbon	AA	603	GBDYU3052GEZZ	Bottom Plate	AG
350	VRD- RA2BE472J	4.7k ohm, 1/8W, 5%, Carbon	AA	604	GC5VA1513GEZZ	Antenna Terminal Cover	AE
351	VRD- RA2BE103J	10k ohm, 1/8W, 5%, Carbon	AA	607	LHLDZ1609GEZZ	Y/C Holder	AA
352	VCTYP A1EX473M	.047 μ F, 25V, 20%, Ceramic	AA	608	QEARP0276GEFW	Earth Plate, Upper	AA
401	LX- WZ1020GE00	Cut Washer (4.2W-6.0-0.5)	AA	609	MSPRC0145GEFJ	Spring, Power	AA
402	LX- HZ3046GEFD	Screw (B Tight BTN3P+6S)	AA	610	XEBSD30P12000	Screw	AA
SCREWS, NUTS, WASHERS				611	XHPSD30P06WS0	Screw	AA
				612	XEBSD40P12000	Screw	AA
201	LX- NZ3039GEZZ	Adjusting Nut	AA	613	TLABS0002GEZZ	Caution Label	AA
202	XWHS D26- 05060	Washer W2.6S-6-0.5	AA	614	LX- HZ3040GEFF	Screw, Top Cabinet	AA
203	XRESJ20- 04000	E Ring-2	AA	615	LHLDP1013GE00	Power LED Holder	AB
204	LX- BZ3095GEFD	AC Head Screw	AA	616	LHLDZ1619GEZZ	Tuner Holder	AA
205	XBPSD26P06000	Azimuth Adjusting Screw	AA	617	LHLDZ1614GEZZ	Digitron Holder	AC
206	LX- BZ3096GEFD	Tilt Adjusting Screw	AA	618	PSPAZ0202GEZZ	Spacer	AC
207	XNFSD40- 31000	Adjusting Nut (A/C Head)	AA	619	TLABM1632GEZZ	Model Label	AB
208	XWHJZ31- 05054	Washer W3.1-5.4-0.5	AA	620	LX- HZ3047GEFF	Screw, Bottom Plate	AA
209	LX- WZ1041GE00	Washer W2.6-6-0.5 (LM)	AA	621	LHLDZ1624GEZZ	Trans. Holder	AB
210	XHPSD26P06WS0	Screw C2.6P+6S	AA	622	PSPAZ0200GEZZ	SPACER	AA
211	LX- RZ3001AEZZ	E Ring-3	AA	FRONT PANEL PARTS			
212	XWHJZ45- 02060	Washer PSW4.6-6-0.25	AA				
213	LX- NZ4043GEFW	Adjusting Nut (X-Position)	AB	501	CPNLC1542GE06	Front Panel Ass'y	BA
215	LX- WZ1003GE00	Washer CW2.5-0.5	AA	501-1	HDECQ0538GES A	Front Decoration Cover	AK
216	XRESJ12- 03000	E Ring-1.2	AA	501-2	JB TN- 2227GES A	Button, Record	AA
217	XBPSD26P03000	Screw 2.6P+3S	AA	501-3	QEARP0272GEFW	Earth	AC
218	LX- WZ1006GE00	Washer CW2.5-5.4-0.5	AA	501-4	PC5VU9135GESB	Display Filter	AF
219	XRESJ25- 04000	E Ring-2.5	AA	501-5	LHLD S1010GEZZ	Door Latch	AA
220	XWHJZ25- 05050	Washer W2.6-5-0.5	AA	501-6	GC5VA1522GES A	Cover, Power LED	AD
221	XWHJZ25- 01050	Washer W2.6-5-0.13	AA	501-7	JB TN- 2236GES A	Button, Power	AD
222	XWHJZ25- 02050	Washer W2.6-5-0.25	AA	501-8	GC5VA1425GEZZ	Cover, Remote Control	AC
223	LX- HZ3043GEZZ	Screw W2.6P+6S	AA	501-9	JB TN- 2237GES A	Button, Eject	AD
224	LX- BZ3099GEZZ	Screw WSW2P+11S (W5)	AB	501-10	Hi NDP1550GES A	Indication Plate, inside the door	AH
225	LX- XZ3030GEFD	Screw M2x4	AC	501-11	LANGF9363GE00	Angle, Door	AE
226	XHPSD26P08WS0	Screw C2.6P+8S	AA	501-12	GD5RF1543GES A	Door	AH
227	XJBSD26P08WS0	B Tight Screw C2.6P+8S	AA	501-13	HBDGB1001GESB	Badge "SHARP"	AD
228	XHPSD30P08WS0	Screw C3P+8S	AA	501-14	TCAUH3178GEZZ	Caution Label	AB
				501-16	TLABH0420GEZZ	Label (inside the door)	AC
				501-17	ZTAPEN050070E	Asetate Tape	AC

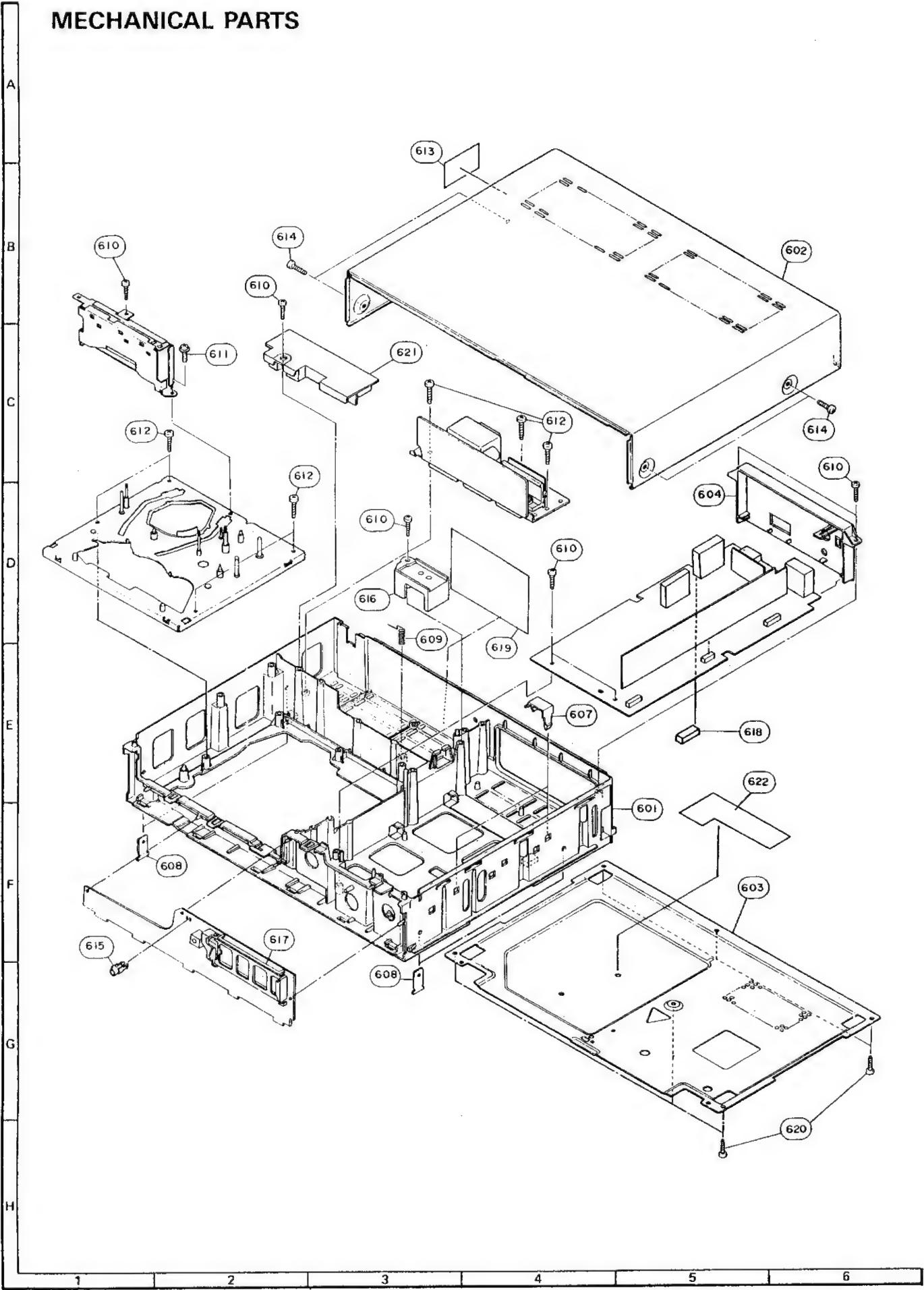
MECHANISM CHASSIS PARTS



CASSETTE HOUSING CONTROL PARTS



MECHANICAL PARTS



VC-T310H

PACKING OF THE SET

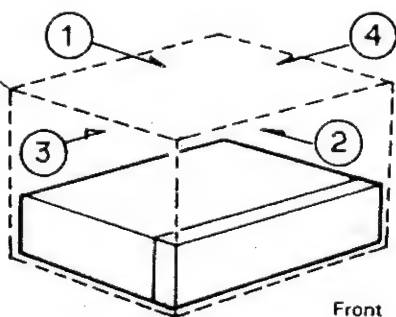
• Setting positions of the Knobs

Full auto	I position	Color mode	B & G
Picture tone	Center click	Band selector	Normal
RF converter output	36 CH	Test signal	OFF

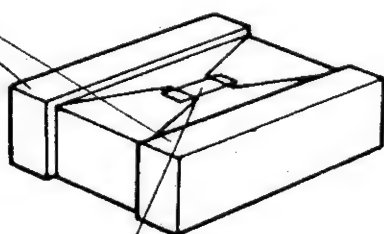
* Accessories

★ TGAN-1024CEZZ	Guarantee card
★ TiNS-1194GEZZ	Operation manual
★ QCNW-2702GEZZ	Antenna cord
★ TBATU0004CEZZ	Dry Battery

★ SPAKP0005GEZZ
Polystyrene Sack



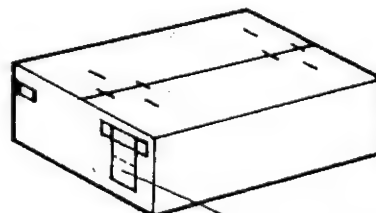
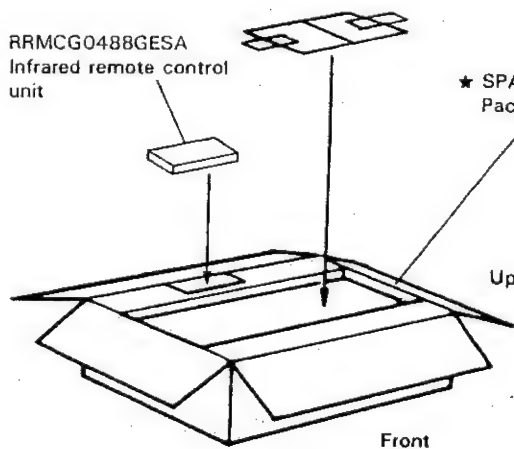
★ SPAKX0492GEZZ
Buffer material (Rear)



Fix with craft tape

RRMCG0488GESA
Infrared remote control
unit

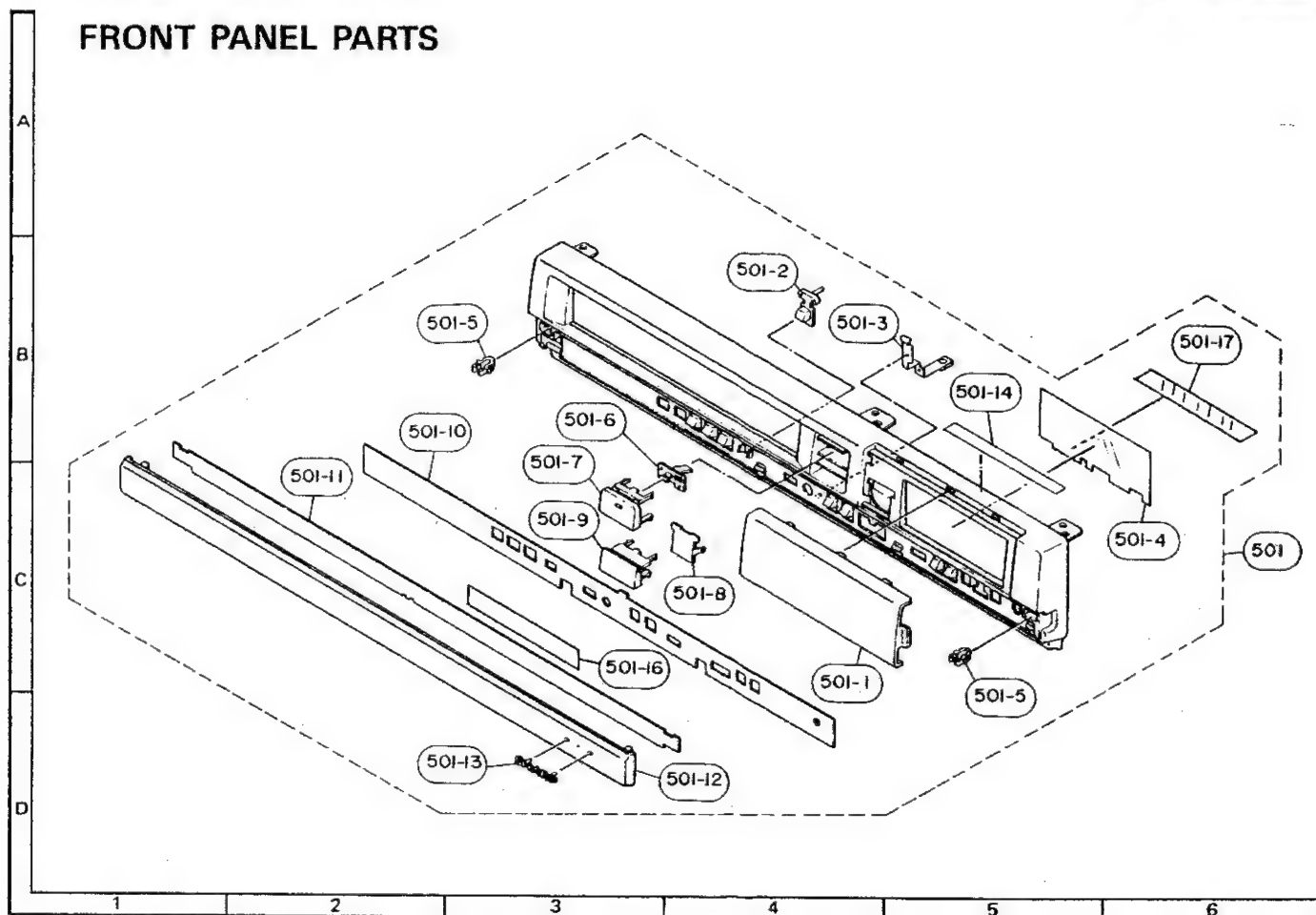
★ SPAKC1456GEZZ
Packing case



No. Card
TLABK1632GEZZ

★ Not Replacement Items

FRONT PANEL PARTS



SCHEMATIC DIAGRAM

IMPORTANT SAFETY NOTICE:

BE SURE TO USE GENUINE PARTS FOR SECURING THE SAFETY AND RELIABILITY OF THE SET. PARTS MARKED WITH "Δ" AND PARTS SHADED (IN BLACK) ARE ESPECIALLY IMPORTANT FOR MAINTAINING THE SAFETY AND PROTECTING ABILITY OF THE SET.

BE SURE TO REPLACE THEM WITH PARTS OF SPECIFIED PART NUMBER.

SAFETY NOTES:

1. DISCONNECT THE AC PLUG FROM THE AC OUTLET BEFORE REPLACING PARTS.
2. SEMICONDUCTOR HEAT SINKS SHOULD BE REGARDED AS POTENTIAL SHOCK HAZARDS WHEN THE CHASSIS IS OPERATING.

NOTES:

1. The unit of resistance "ohm" is omitted ($k = 1000 \text{ ohm}$, $M = 1 \text{ Meg ohm}$).
2. All resistors are 1/8 watt, unless otherwise noted.
3. The unit of capacitance "F" is omitted ($\mu = \mu F$, $p = pF$).
4. The values in parentheses are the ones in the PB mode; the values without parentheses are the ones in the REC mode.

VOLTAGE MEASUREMENT CONDITIONS:

1. DC voltages are measured between points indicated and chassis ground by VTVM, with AC240V/50Hz supplied to unit and all controls are set to normal viewing picture unless otherwise noted.
2. Voltages are measured with 10000 μV B & W or colour signal.

WAVEFORM MEASUREMENT CONDITIONS:

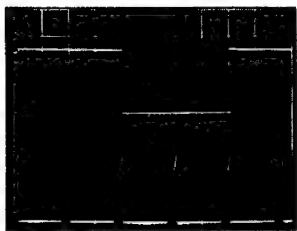
10000 μV 87.5 percent modulated colour bar signal is fed into tuner.

CAUTION:

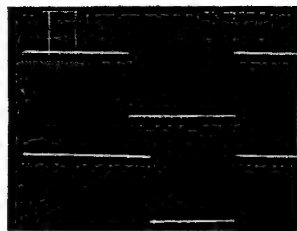
This circuit diagram is original one. Therefore there may be a slight difference from yours.

WAVE FORMS

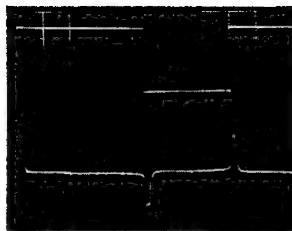
SYSTEM CONTROL, SERVO, IF PWBs



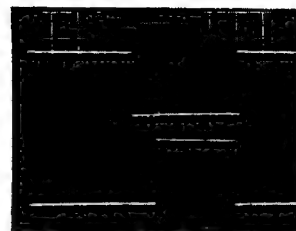
TP701 ① pin
Head switching pulse
2V/Division
5msec/Division
IC701 ② pin
Drum pulse generator
1V/Division
5msec/Division



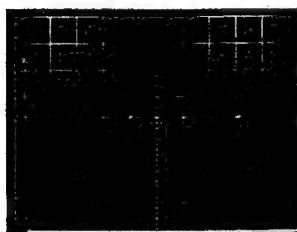
TP701 ① pin
Head switching pulse
2V/Division
5msec/Division
TP701 ② pin
Tracking MM pulse
2V/Division
5msec/Division
— Record mode —



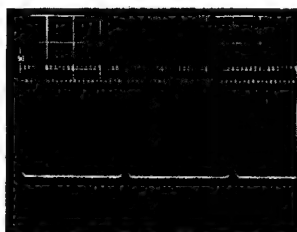
TP701 ③ pin
Playback control pulse
2V/Division
5msec/Division
IC701 ④ pin
Playback control signal
500mV/Division
5msec/Division



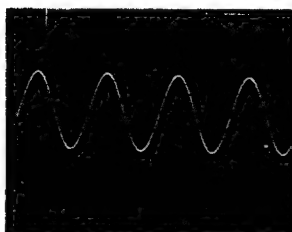
TP701 ① pin
Head switching pulse
2V/Division
5msec/Division
TP701 ② pin
Tracking MM pulse
2V/Division
5msec/Division
— Playback mode —



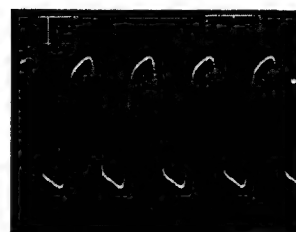
IC701 ③ pin
Horizontal sync pulse
1V/Division
5msec/Division



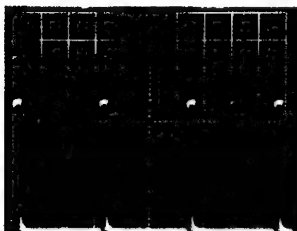
Socket AM ⑨ pin
Drum frequency generator signal
50mV/Division
10msec/Division
Socket AM ⑫ pin
Drum phase generator pulse
200mV/Division
10mV/Division



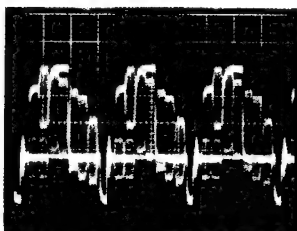
Socket AM ⑮ pin
Capstan frequency generator signal
500mV/Division
0.5msec/Division



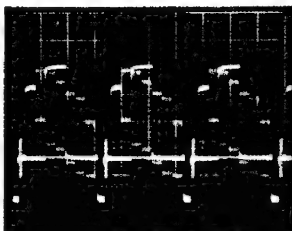
Plug AV ⑧ pin
4.43MHz oscillation signal
200mV/Division
0.1μsec/Division



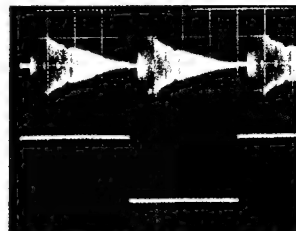
TP2201
Horizontal sync pulse
1V/Division
20μsec/Division
— Record mode —



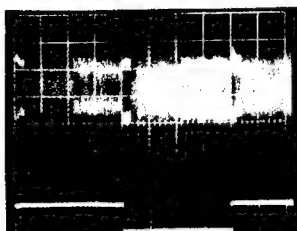
Video output terminal
(Video output is shorted with a 75 ohm resistor.)
Video signal
200mV/Division
20μsec/Division
— Playback mode —



Video output terminal (E-E level)
(Video output is shorted with a 75 ohm resistor.)
Video signal
200mV/Division
20μsec/Division
— Record mode —

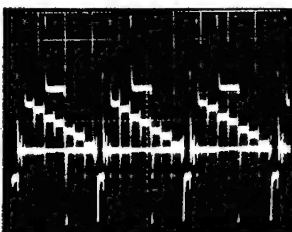


TP1
Playback preamp. signal
200mV/Division
5msec/Division
TP2
Head switching pulse
2V/Division
5msec/Division
— Playback mode —
(Sweep tape)

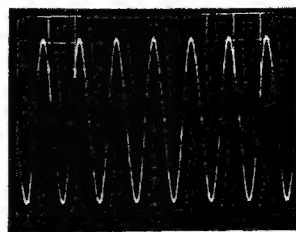


TP1
Playback preamp. signal
50mV/Division
5msec/Division
TP2
Head switching pulse
5V/Division
5msec/Division
— Playback mode —
(color bar)

Y/C, AUDIO PWB



TP201
White/Dark clip signal
100mV/Division
20μsec/Division
— Record mode —



K602 ⑨, ⑪ pin
(Between audio erase head and ground)
10V/Division
10μsec/Division
— Record mode —

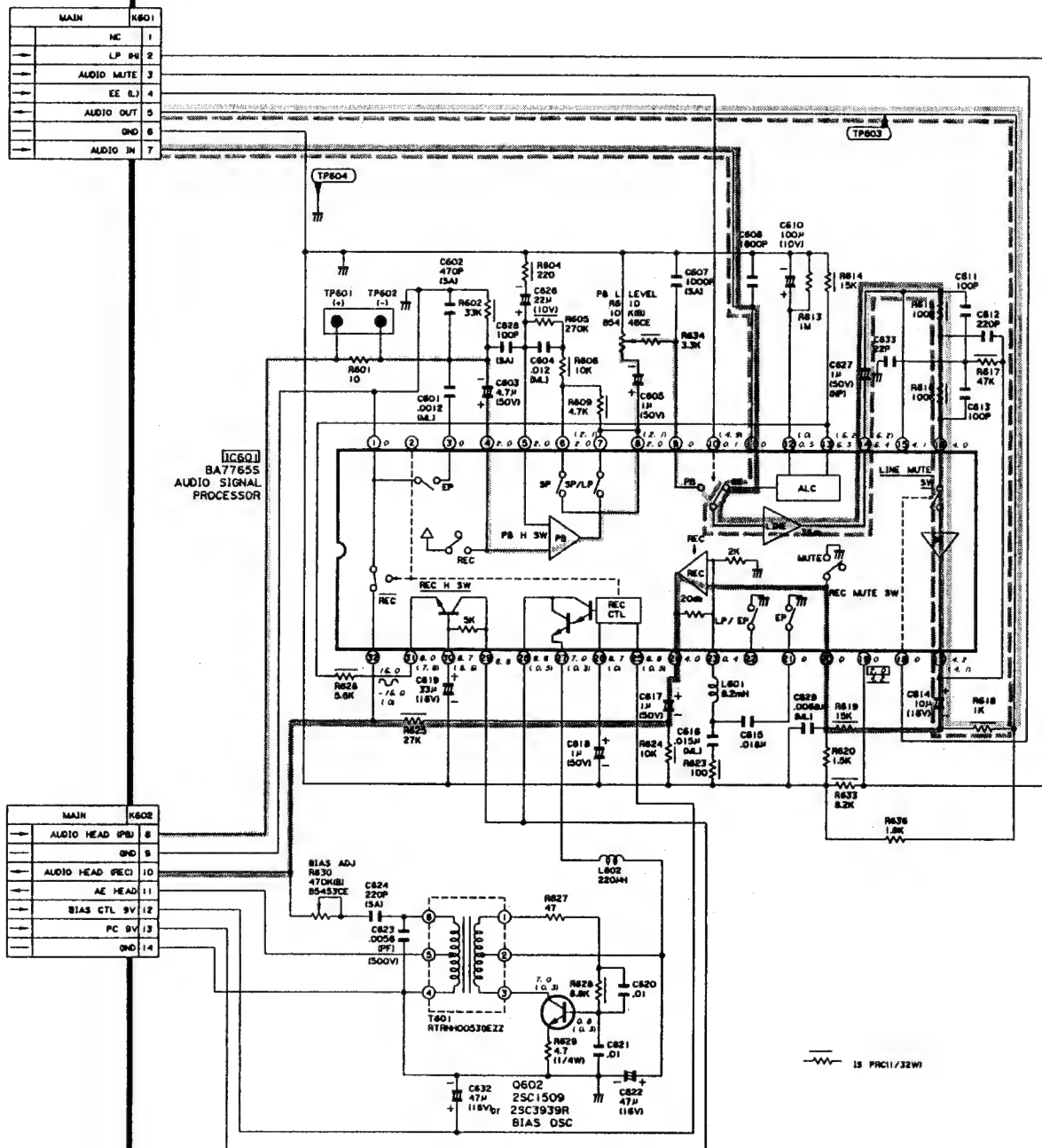
AUDIO CURCUIT

Audio Playback Signal

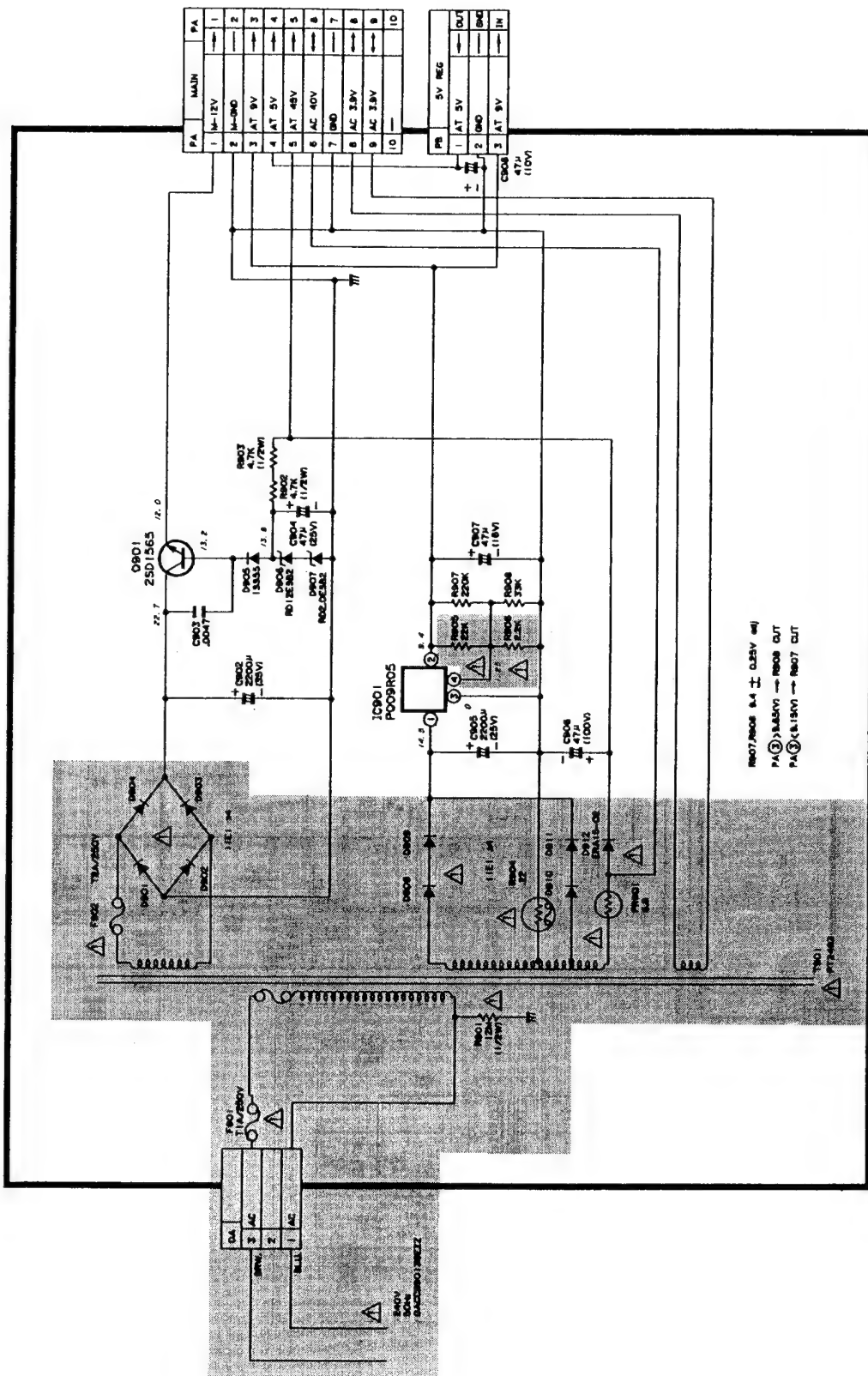
Audio Record Signal

Audio E-E Signal

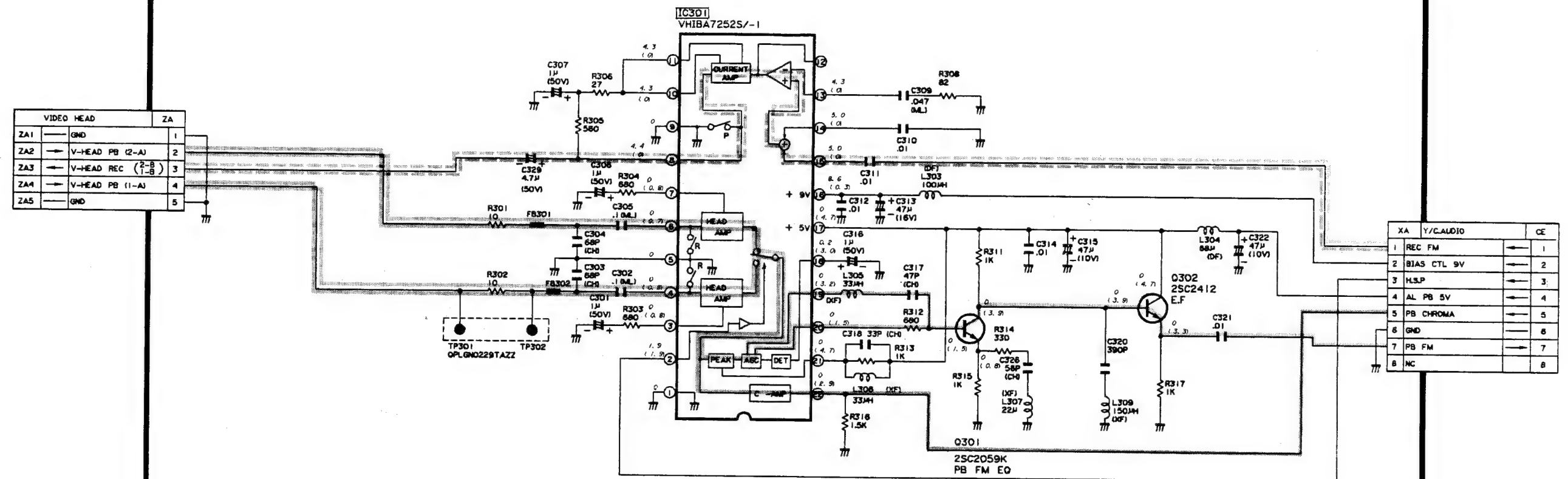
RUNTK0505GEZZ



POWER CIRCUIT



DUNTK2948TM51



SYSTEM CONTROL, SERVO, IF CIRCUIT (MAIN 2)

Playback Chrominance Signal

Playback Luminance Signal

Video E-E Signal

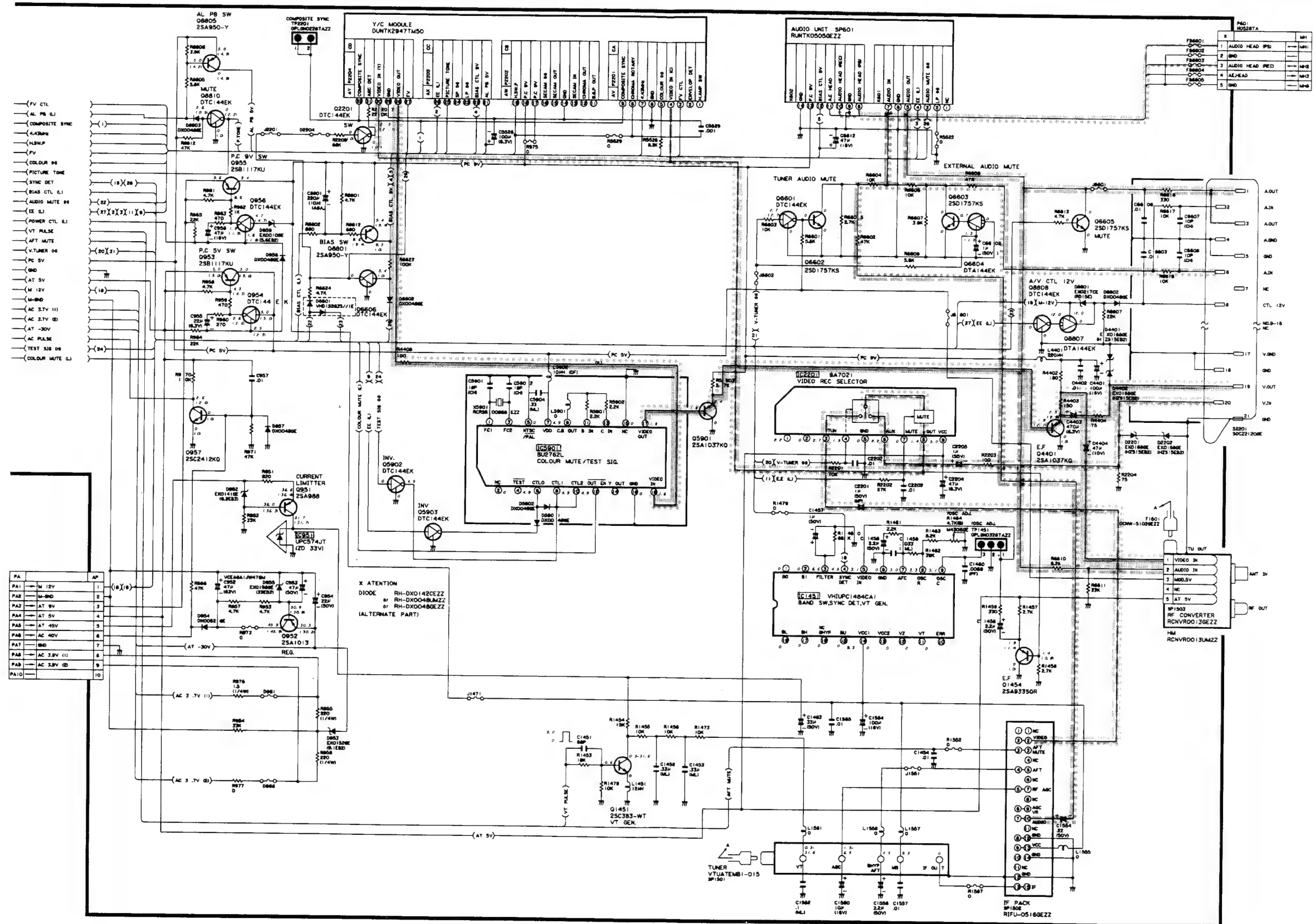
Audio Record Signal

Record Luminance Signal

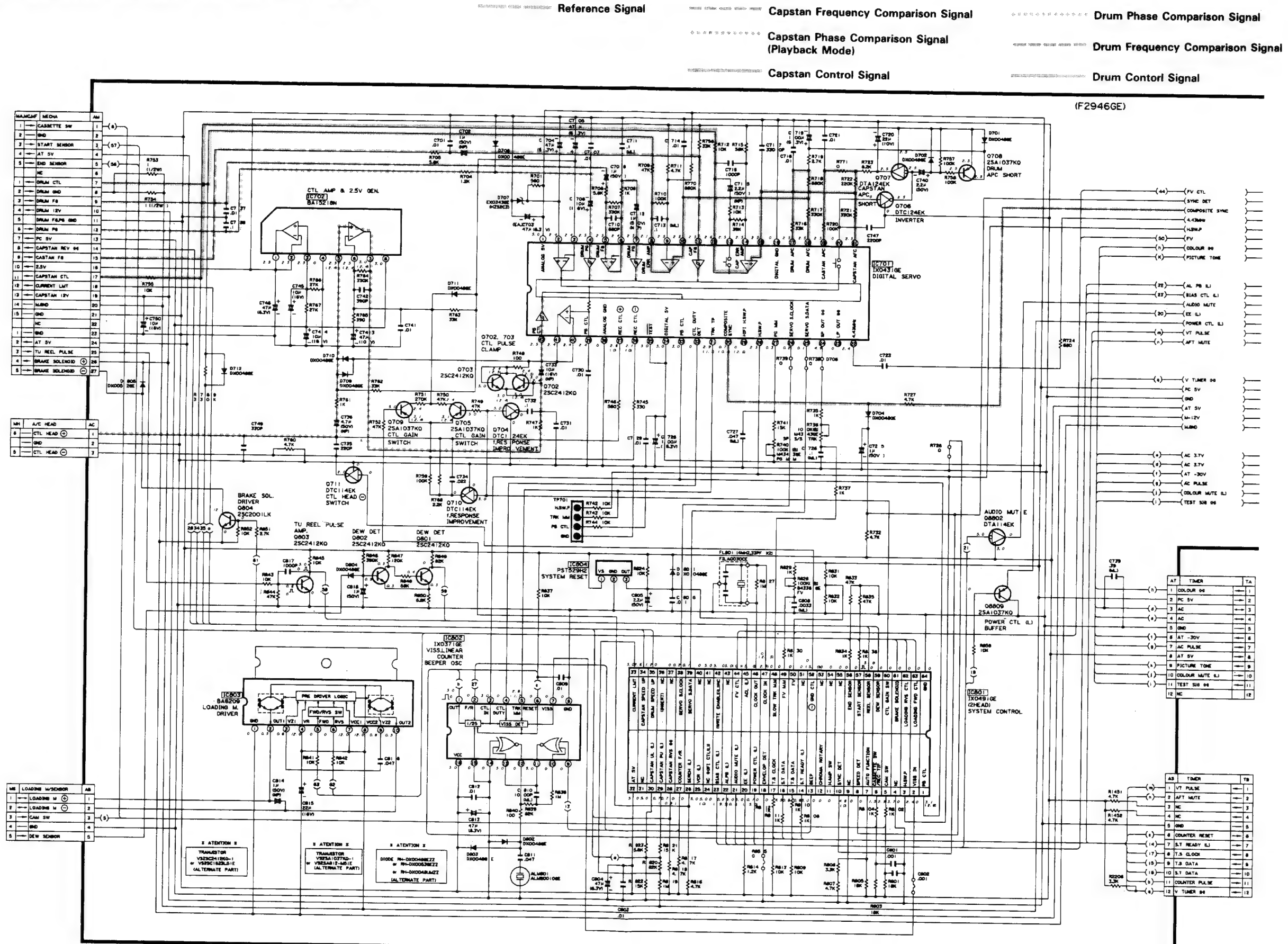
Record Chrominance Signal

Audio E-E Signal

Audio Playback Signal



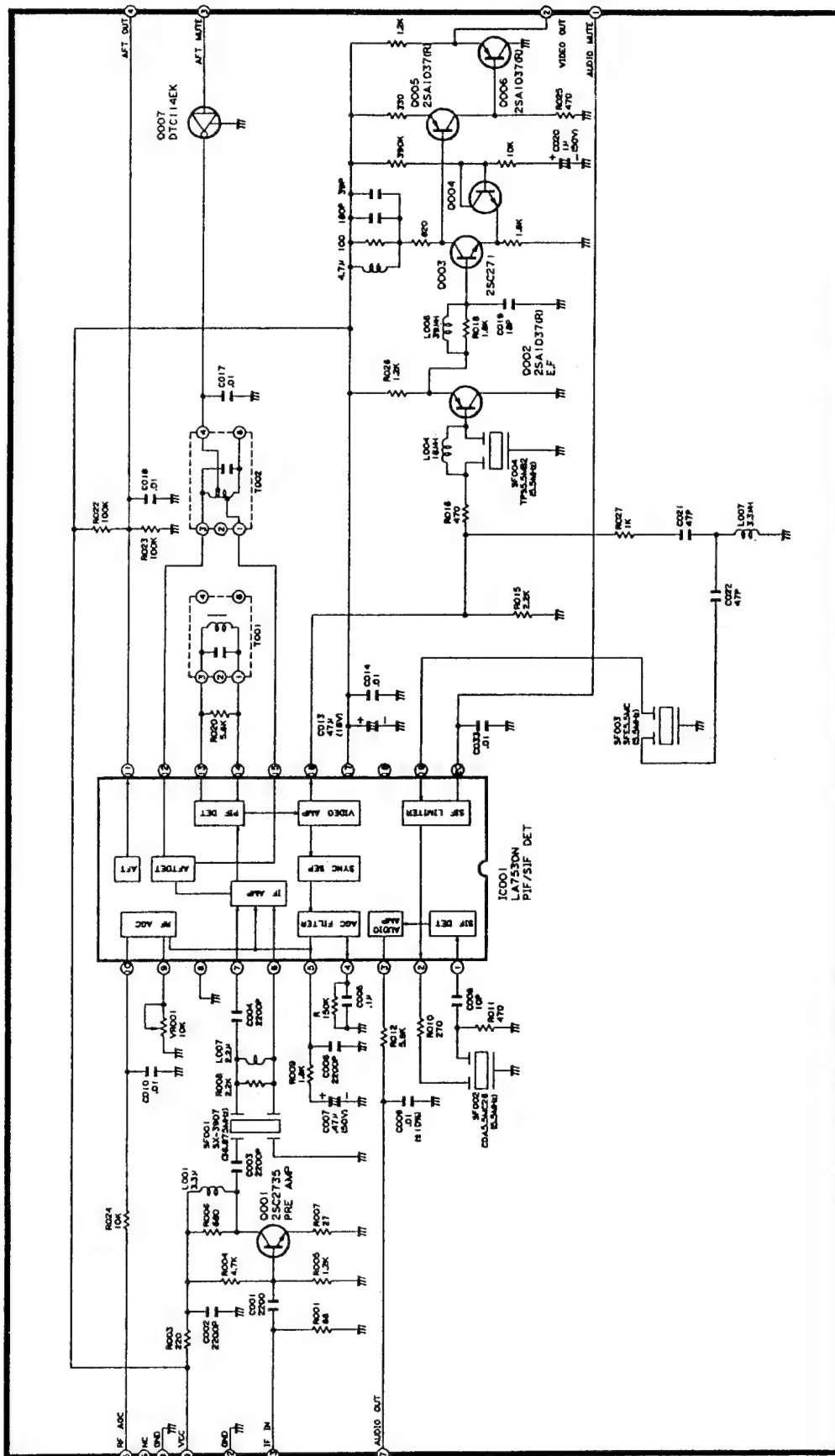
SYSTEM CONTROL, SERVO, IF CIRCUIT (MAIN 1)





IF PACK CIRCUIT

RIFU-0516GEZZ



SHARP SERVICE MANUAL

S98K1VC-T310H

VHS VIDEO CASSETTE RECORDER



MODEL VC-T310HM

The service manual covers only those items that differ from the VC-T310H. For information on any other items, refer to the service manual for the VC-T310H.

CONTENTS

• REPLACEMENT PARTS LIST	2
• EXPLODE VIEWS	4
• PACKING OF THE SET	6

PARTS LIST

PARTS REPLACEMENT

Replacement parts which have these special safety characteristics identified in this manual; electrical components having such features are identified by Δ in the Replacement Parts Lists.

The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

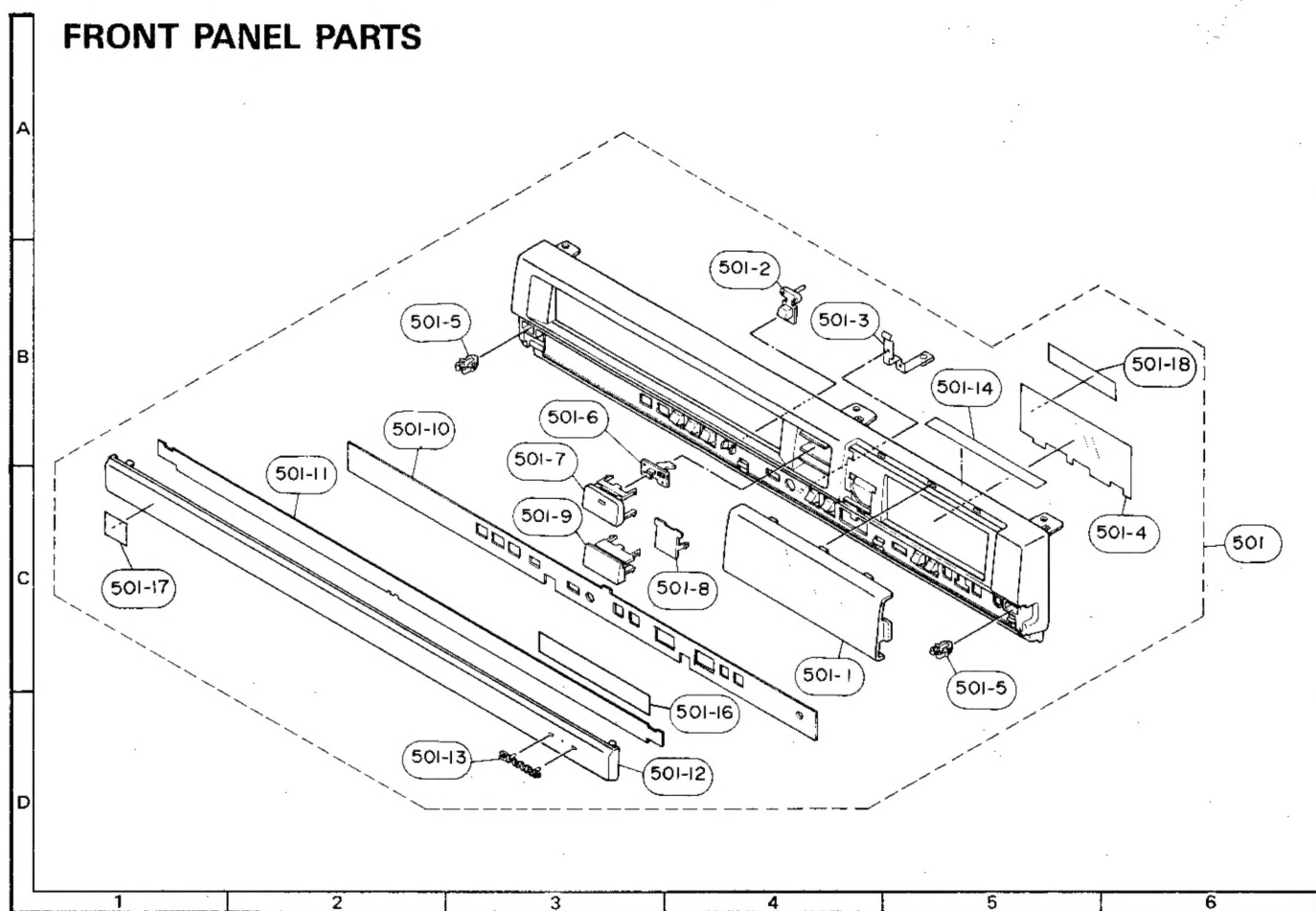
To have your order filled promptly and correctly, please furnish the following informations.

- | | |
|-----------------|----------------|
| 1. MODEL NUMBER | 2. REF. NO. |
| 3. PART NO. | 4. DESCRIPTION |
| 5. CODE | |

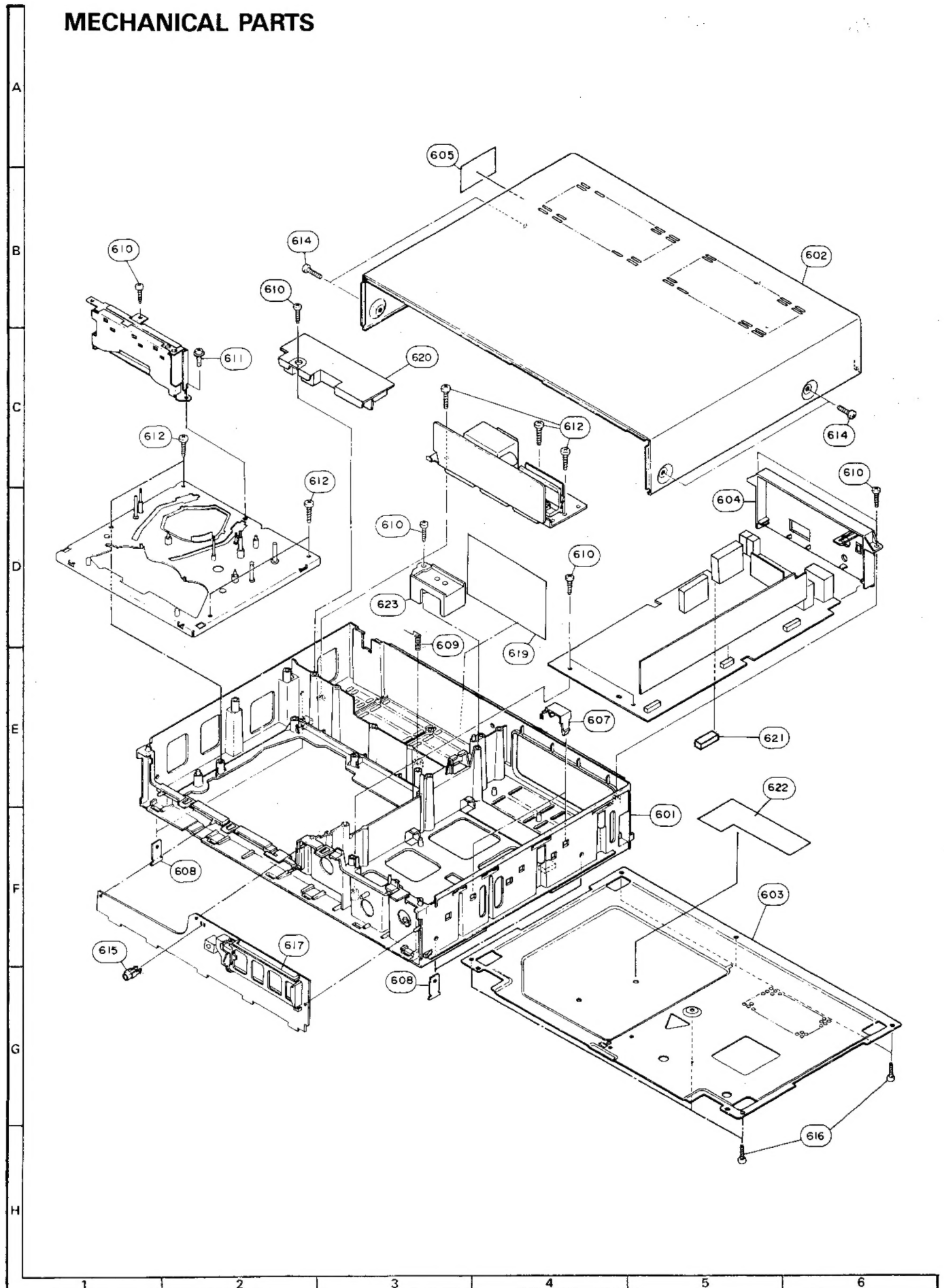
REF. NO.	PART NO.	*	DESCRIPTION	CODE
MISCELLANEOUS				
	RCNVR0013UMZZ	U	RF Converter	—
	QS6CN1294UMZZ	U	12 pin (AS,AT)	—
	QS6CN2794UMZZ	U	27 pin (AM)	—
Y/C CIRCUIT				
	DUNTK2947TEVO		Y/C Board Assembly	—
DIODES				
D201, 202, 203, 204, 502, 503, 504	RH-DX0048UMZZ	U	1N4531	—
COIL				
DL501	RCi LZ0191GEZZ		Delay Line	AM
CAPACITORS				
C218	RC-QZZ224UMYK	U	0.22 μ F, 63V, 10%, Mylar	—
C224	RC-QZZ473UMYK	U	0.047 μ F, 63V, 10%, Mylar	—
C230	RC-QZZ104UMYK	U	0.1 μ F, 63V, 10%, Mylar	—
C523	RC-QZZ393UMYK	U	0.03 μ F, 63V, 10%, Mylar	—
TIMER CIRCUIT				
	DUNTK2954TEVO		Timer Board Assembly	—
DIODES				
D5001 5004, 5006, 5007, 5010, 5013, 5019, 5020, 5021	RH-DX0048UMZZ	U	1N4531	—
MISCELLANEOUS				
	QS6CN1295UMZZ	U	12 pin (TA,TB)	—

REF. NO.	PART NO.	*	DESCRIPTION	CODE
MAIN(SERVO, SYSTEM-CONTROL, IF) CIRCUIT				
	DUNTK2946TEV4		Main (Servo, System-Control, IF) Board Assembly	—
DIODES				
D701, 702, 704, 708, 712, 801, 804, 956, 957, 5901, 5902, 6602, 8802, 8803 D6601	RH-DX0048UMZZ	U	1N4531	—
	VHDDAP202K/1E			AA
CAPACITOR				
C711, 713, 726, 1562	RC-QZZ104UMYK	U	0.1 μ F, 6.3V, 10%, Mylar	—
C727	RC-QZZ473UMYK	U	0.047 μ F, 63V, 10%, Mylar	—
C739	RC-QZZ394UMYK	U	0.39 μ F, 63V, 10%, Mylar	—
C810	RC-QZA102TAYJ		1000 μ F, 50V, 5%, Mylar	AB
C1452, 1453	RC-QZZ334UMYK	U	0.33 μ F, 63V, 10%, Mylar	—
C1459	RC-QZZ333UMYK	U	0.033 μ F, 63V, 10%, Mylar	—

FRONT PANEL PARTS



MECHANICAL PARTS



REF. NO.	PART NO.	*	DESCRIPTION	CODE	REF. NO.	PART NO.	*	DESCRIPTION	CODE
HEAD AMP CIRCUIT					609	MSPRC0145GEFJ		Spring, Power	AA
	DUNTK2948TEVO		Head Amp Board Assembly	—	610	XEBSD30P12000		Screw	AA
					611	XHP3D30P06WS0		Screw	AA
					612	XEBSD40P12000		Screw	AA
					614	LX- HZ3040GEFF		Screw, Top Cabinet	AA
					615	LHLD P1013GE00		Power LED Holder	AB
					616	LX- HZ3047GEFF		Screw Bottom Plate	AA
					617	LHLDZ1614GEZZ		Digitron Holder	AC
					619	TLABM0074UMZZ	U	Model Label	—
					620	LHLDZ1624GEZZ		Insulator	AC
					621	PSPAZ0202GEZZ		Spacer	AC
					622	PSPAZ0200UMZZ	U	Spacer	—
					623	LHLDZ1619UMZZ	U	Tuner Holder	—
CAPACITORS					FRONT PANEL PARTS				
C302, 305	RC- QZZ104UMYK	U	0.1 μ F, 63V, 10%, Mylar	—	501	CPNLC1542TEV2		Front Panel Ass'y	BA
C309	RC- QZZ473UMYK	U	0.047 μ F, 63V, 10%, Mylar	—	501-1	HDECQ0538UMSA	U	Front Decoration Cover	—
POWER CIRCUIT					501-2	JB TN- 2227UMSA	U	Button, Record	—
	RDENT0318UMZZ	U	Power Board Assembly	—	501-3	QEARP0272UMFW	U	Earth	—
THE OTHER PARTS					501-4	PCöVU9135GESB		Display Filter	AF
	QCNW- 3741UMZZ	U	Antenna Cord	—	501-5	LHLD S1010UMZZ	U	Door Latch	—
	TGAN- A037WRR0	U	Guarantee Card	—	501-6	GCöVA1522UMSA	U	Cover, Power LED	—
	Ti NS- 1212UMZZ	U	Operation Manual	—	501-7	JB TN- 2236UMSA	U	Button, Power	—
MECHANICAL PARTS					501-8	GCöVA1425UMZZ	U	Cover, Remote Control	—
601	GCABB1079UMZZ	U	Main Frame	—	501-9	JB TN- 2237UMSA	U	Button, Eject	—
602	GCABA3046UMS3	U	Top Cabinet Ass'y	—	501-10	Hi NDP1550UMSA	U	Indication Plate, inside the door	—
603	GBDYU3052UMZZ	U	Bottom Plate	—	501-11	LANGF9363UM00	U	Angle, Door	—
604	GCöVA1513UMZZ	U	Antenna Terminal Cover	—	501-12	GDöRF1539UMSA	U	Door	—
605	TLABS0002UMZZ	U	Caution Label	—	501-13	HB DGB1001UMSB	U	Badge "SHARP"	—
607	LHLDZ1609GEZZ		Y/C Holder	AA	501-14	TCAUH3178UMZZ	U	Caution Label	—
608	QEARP0276UMFW	U	Earth Plate, Upper	—	501-16	TLABH0420UMZZ	U	Label (inside the door)	—
					501-17	TLABZ0220UMZZ	U	Made in UK Label	—
					501-18	ZTAPEN05330ME		Asetate Tape	AA

PACKING OF THE SET

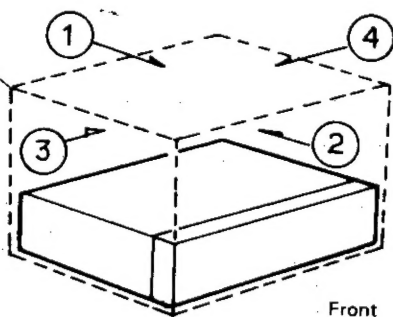
• Setting positions of the Knobs

Full auto	I position	Colour mode	B & G MUTE
Picture tone	Center click	Tuning selector	Normal
RF converter output	36 CH		

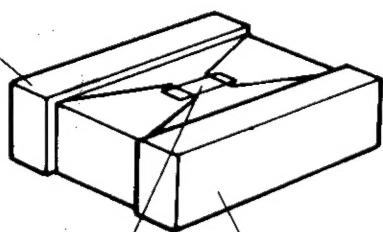
* Accessories

- | | |
|-----------------|------------------|
| ★ TGAN-A037WRR0 | Guarantee card |
| ★ TiNS-1212UMZZ | Operation manual |
| ★ QCNW-3741UMZZ | Antenna cord |
| ★ UBATU0007UMZZ | Dry Battery |

- ★ SPAKP0005GEZZ
Polystyrene Sack



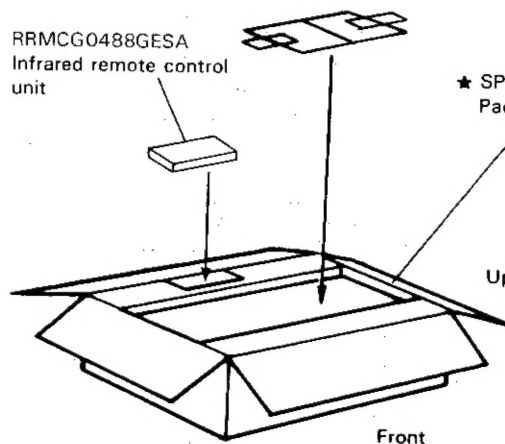
- ★ SPAKX0492UMZZ
Buffer material (Rear)



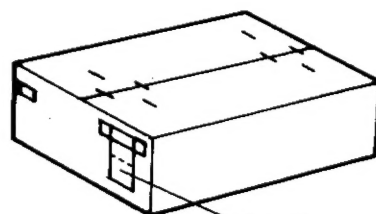
- ★ SPAKX0502UMZZ
Buffer material (Front)

Fix with craft tape

- RRMCG0488GESA
Infrared remote control
unit



- ★ SPAKC1459UMZZ
Packing case



- No. Card
TLABK0001UMZZ

★ Not Replacement Items